# MEDICINE
## FOR
# STUDENTS

BY


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WITH A FOREWORD TO THE FIRST EDITION BY

LATE DR. RUSTOM JAL VAKIL

**TWELFTH EDITION**

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# PREFACE TO THE TWELFTH EDITION

In its 12th edition, this favourite handbook amongst medical students is slightly larger than its predecessor. This is because of changes and revision to keep pace with the new requirement and developments in the subject. Apart from revision, certain sections have been rewritten. The new topics are largely confined to Diseases of Children. Others include Adult respiratory distress syndrome, Disorders of water and electrolyte metabolism, Acid-base disturbances, Inborn errors of metabolism, Sexually transmitted diseases and a section on Drugs with multiple indications. There are some new radiographs and a diagram of ova of common intestinal worms.

The problem that arises in a book of this type is not of what one should put in, but of what one should leave out As in previous editions pathology and rare diseases have been omitted.

Thanks are due to Dr. (Mrs) Mahrukh Joshi, Hon. Associate Prof. of Paedeatrics and Dr. Burjor Bharucha, Tutor in Paediatrics, and Dr. Rui Fernandes, Hon. Dermatologist, K.E M. Hospital for revising the Chapters on Diseases of Children and Skin diseases.

The book should continue to supply, par excellence, the needs of the final year student.

ASPI F. GOLWALLA

*December, 1982* SHARUKH A. GOLWALLA

# FOREWORD
## TO THE FIRST EDITION

Dr. Golwalla's book has been written in response to numerous requests from medical students for a handy and concise manual. In his aim to satisfy their needs, the author has succeeded admirably, for, within the small compass of a few hundred pages, he has succeeded in amassing a vast amount of knowledge and has presented the same in readily assimilable form

The last few decades have witnessed such rapid strides and revolutionary changes in our concepts of medical subjects, that the need for a complete reorientation of our ideas in the light of these recent advances has been felt for some time.

I have no doubt that this book will come as a veritable boon to the many students of medicine, who harassed and over-burdened by the multiplicity of subjects in their curriculum, have little time at their disposal to wade through the mass of literature that is annually pouring forth from different parts of the world.

In the case of the busy practitioner also, the exigencies of a professional career preclude any detailed study of medical advances; hence his demand for more concise texts with sequential arrangement of material

Although the summary style of presentation adopted here may fail to satisfy the literary appetite of some readers, it should be remembered that the central aim of the author has been to present the salient and indisputable facts of medical knowledge in simple form rather than to write yet one more text book of medicine. A similar method of presentation of the subject has been applied with great success in the past by my teacher Sir Henry Tidy in his "Synopsis of Medicine", which book has not only gone into innumerable editions and been translated into several languages but has gained for the author world-wide recognition and popularity

This is an age of "progress" and "readjustment" in medicine with many of our most cherished concepts of the past abandoned in the face of recent observations and experiments The old order has changed. There is an increasing demand on the part of the overburdened student and the busy doctor for guidance of practical value in their daily pursuance of medical practice. Dr. Golwalla's book should go a long way towards satisfying that demand

RUSTOM JAL VAKIL

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# I. The Digestive System

## 1. THE TONGUE IN DIAGNOSIS

**Congenital lingual disorders:** Apart from developmental anomalies such as tongue tie, following variations are without clinical significance:—

1. *Fissured tongue* (Scrotal tongue)—Deep fissures mostly in longitudinal direction.

2. *Geographical tongue* (Benign migratory glossitis or the wandering rash of the tongue)—For no apparent reason the filiform papillae disappear in oval patches and leave smooth red areas which look like the boundaries of countries on a map.

3. *Median rhomboid glossitis.*—Rhomboidal or oval, red, slightly elevated area on the dorsum of the tongue due to failure of fusion of lateral segments of the tongue. (It may be a chronic hypoplastic candidiasis rather than a developmental anomaly.)

4. *Furred tongue*—Fur is formed continuously and normally removed by food and saliva. Fur is quite marked if the tongue is not used much, and in smokers.

5. *Rough clean tongue*—Rather large tongue with unusually well-marked fungiform papillae.

6. *Horny tongue* (Crocodile or toad tongue)—Various types of cornification of the mucosa.

**Size:**

*Macroglossia*—(a) *Acute*—(i) Inflammatory. (ii) Non-inflammatory in angioneurotic oedema. (b) *Chronic*—Acromegaly, myxoedema, amyloidosis and in children von Gierke's glycogen storage disease. Other rare causes are congenital arterio-venous fistula between lingual artery and vein, pachydermoperiostosis, and lymphangioma circumscripta superficialis due to hyperplasia of lymphatic vessels.

*Microglossia*—Undue smallness of the tongue in dehydration, atrophic glossitis, wasting due to hypoglossal nerve involvement, facial hemiatrophy, or pseudobulbar palsy (small pointed compact looking tongue). In myasthenia gravis atrophy of the tongue may give rise to triple longitudinal furrowing. Bilateral atrophy (with fasciculations) in progressive bulbar paralysis.

**Ulcers:**

1. *Traumatic*—(a) At margins of tongue in epilepsy. (b) Ulcer of frenum (sublingual ulcer) in whooping cough. (c) Dental—opposite a carious tooth.
2. *Tuberculous ulcer*—associated with pulmonary tuberculosis. It is painful and tends to occur near the tip of the tongue.
3. *Recurrent aphthous ulcers*—of unknown etiology, or at times with idiopathic steatorrhoea or ulcerative colitis. Rarely from Stevens-Johnson syndrome (erythema multiforme) and Bechet's syndrome (recurrent oral, genital and eye ulceration with neurological signs).
4. *Epitheliomatous ulcer*—deep and indurated.
5. *Gummatous ulcer*—deep and circumscribed with greyish slough covering the base.

**Colour:**

1. Pale tongue in anaemia.
2. Red raw 'angry looking' tongue in sprue, pellagra, severe and untreated diabetes, prolonged febrile illness.
3. White patches or flakes on tongue due to curdled milk, thrush, syphilitic patches. *Leukoplakia* denotes any persistent white patch on mucous membrane of dorsum of tongue (or lips, gum or cheek). It is mostly seen in men over 40. Predisposing factors include smoking, betel nut chewing, spicy food and syphilis. Leukoplakia is a precancerous state.
4. Magenta colour in riboflavin deficiency.
5. Blue tongue denotes central cyanosis.
6. Purple tongue in polycythemia.
7. Dark red or bluish red tongue in polycythemia vera, riboflavin deficiency, broad spectrum antibiotics.
8. Strawberry tongue—in scarlet fever the tongue is very red with the papillae standing out as white dots.
9. Excessively furred tongue—(a) In all febrile conditions especially typhoid. (b) Poor oral hygiene and mouth breathing. (c) Trismus as from a carious tooth.
10. Yellow tongue—Rarely in jaundice, or due to irritants like nitric or hydrochloric acid.
11. Black tongue—due to fungus infection, iron, bismuth. opium or tobacco.
12. Slaty blue tongue in haemochromatosis.
    Black hairy tongue—Yellowish brown or black furry patches made up of hypertrophied and densely matted

papillae usually from antibiotic ingestion or excessive smoking.

13. Brownish fur with dry tongue (Parrot tongue)—in chronic renal failure.

**Moisture:** The tongue in health is moist. Dryness of the tongue may be part of general dehydration as in diarrhoea, vomiting and diabetes mellitus. It is worsened by mouth breathing. Certain atropine-like drugs may cause appearance of dry tongue and mouth. Bone-dry tongue in Sjogren's syndrome.

**Pigmentation:** (a) In Addison's disease pigmentation of tongue and mouth. (b) Pigmentation may be also seen normally in tropical countries, in chronic cachexia, malabsorption syndrome, and the rare Peutz-Jeghers syndrome. (c) Acanthosis nigricans may rarely involve mouth and tongue and show as thickening and blackening of epithelium. Its significance is that a high percentage of patients with it have visceral cancer.

**Surface:**

*Smooth or bald tongue* (atrophic glossitis)—Atrophy of papillae resulting in glossy or varnished tongue may be due to iron deficiency anaemia, pernicious anaemia, B complex deficiency or malabsorption.

*Fissured tongue*—Vitamin B complex deficiency, mongolian idiocy, acromegaly, acute glossitis, dental trauma, senility or bad oral hygiene, congenital scrotal tongue.

*Scarred tongue*—Scars on the tongue may be traumatic, secondary to ulcers from 'tongue-biting' as in epilepsy.

**Movements:**

1. *Tremors*—(a) Slow rhythmic tremor stopping on voluntary extrusion of tongue in Parkinsonism. (b) Backward and forward 'trombone' tremor of G.P.I. (c) Miscellaneous causes —multiple sclerosis, prolonged fevers, wasting diseases, senility, chronic alcoholism and excessive smoking and thyrotoxicosis.
2. *Lizard tongue* (Jack-in-the-box or watchspring tongue) in rheumatic chorea. After protrusion, the tongue is shot back into the mouth.
3. *Deviated tongue*—with tip and median raphe curving round towards the affected side in hypoglossal nerve paralysis. Also in malignant infiltration, scarification after burns or severe ulceration, facial paralysis.
4. *Immobile tongue* (Paretic tongue)—Bilateral lingual paralysis, advanced malignancy of tongue, bulbar palsy,

syringomyelia. Sluggish and slow protrusion in mental retardation. Increasingly slow movements in myasthenia gravis.

5. *Rolling movements*—in cretins, mongols and frontal lobe tumours. In case of mongols, cretins and in macroglossia, the part of the tongue remains permanently protruded outside the mouth.

6. *Myotonic reaction*—after a sharp tap on the protruded tongue in myotonia atrophica.

**Miscellaneous disorders:**

*Amyloid tongue*—Enlarged tongue with mottling of dark purple areas with translucent matter as part of generalised amyloidosis.

*Purpuric spots*—on the tongue may appear in senile purpura.

*Painful tongue*—Paroxysms of agonising pain in glossopharyngeal neuralgia.

*Alligator tongue*—Dry, thick, furrowed and irregular tongue in diabetes mellitus.

*Secondary deposits*—Small, yellowish grey nodules rarely in medullary carcinoma of thyroid.

## 2. STOMATITIS

**Catarrhal stomatitis**—Usually secondary to—(a) *Local causes*—Poor oral hygiene, excessive use of tobacco, alcohol or spices, or use of broad spectrum antibiotics, or drugs such as iodides or gold. (b) *General causes*—Debility, infectious diseases. The mucous membrane is red with increased exudate from mucus glands.

*Treatment*—(a) Elimination of cause. (b) Alkaline mouth wash. (c) Vitamin B complex.

**Infection**—1. BACTERIAL —*Vincent's stomatitis.* (Ulceromembranous stomatitis)—Ulcer surface covered by a grey pseudomembranous slough demarcated from the surrounding mucosa by a linear erythema. Increased salivation, foetid odour, spontaneous gingival bleeding, lymphadenopathy and fever. Etiology unknown since fusospirochetal organisms may be found in normal mouths. Predisposing factors are tobacco smoking, pre-existing non-specific gingivitis, or local trauma in association with acute psychological disturbance which may precipitate the disease in susceptible individuals.

*Treatment*—Metronidazole 200 mg. t.d.s. for 3 days. Following control of acute phase, oral hygienic control and surgical correction of distortion of gingivae if any.

2. VIRAL—*Acute herpetic gingivostomatitis*—due to herpes simplex. Most common in children. Severe ulceration of oral mucous membrane associated with fever, malaise, and marked lymphadenitis. Initial formation of discrete, spherical grey vesicles which rupture after few hours to form ulcers. Course 7 to 18 days.

*Treatment*—is essentially symptomatic since the disease is self-limiting. Bed rest, mouth washes, and possibly local or systemic antibiotics. Systemic steroids should not be used. Anti-viral agents such as idoxuridine may be effective but the virus develops resistance to the drug.

3. FUNGAL—*Thrush* (Pseudomembranous candidiasis)—Occurs in infants, debilitated adults such as heroin addicts, the elderly, and in patients being treated with corticosteroids and antibiotics. Presents as white lesions which are easily removed leaving a raw bleeding surface. May spread to involve pharynx or oesophagus. Endogenous candidiasis secondary to alteration of host-parasite equilibrium in the mouth may be associated with endocrine dysfunction.

*Treatment*—Mycostatin tablets 500,000 units each to be sucked q.d.s. for about one week. In infants 0 5 per cent solution of gentian violet to be applied t d.s. for 3 days. In elderly 1.5 mega units of Mycostatin by mouth daily for 2 weeks. Mouth wash with saturated solution of soda bicarb.

**Aphthous stomatitis (Canker sores)**—Etiology unknown, probably cell-mediated immunity to oral mucosal antigens. Crops of ulcers often follow periods of emotional stress. Tiny shallow ulcers on erythematous base covered with grayish white exudate. Recurrent condition.

*Treatment*—(a) Alkaline mouth wash and local use of anaesthetic lozenges to relieve pain. (b) Topical steroids 2.5 mg. tablet of hydrocortisone sodium succinate or 0.1 mg. tablet of betamethasone valerate allowed to dissolve in the mouth few times in the day, or 0 1% triamcinolone in a dental paste applied as a thin coating to ulcers twice or three times daily. For severe recurrent ulceration, Prednisolone 40-60 mg. daily for 5-7 days. (c) Topical tetracycline—Mysteclin capsules containing 250 mg. tetracycline and 250,000 U of nystatin. The contents are dissolved in water and the fluid kept in the mouth three or four times a day. (d) Steroids by mouth. (e) Ethinyl oestradiol 0 05-2.0 mg daily for recurrent ulceration appearing before onset of menstrual period. (f) Tranquillisers.

**Vitamin deficiency**—Raw-beef (raw-red) tongue in nicotinic acid deficiency. Angular stomatitis and cheilosis in riboflavin deficiency.

**Drug-induced**—Methotraxate and other folic acid antagonists may cause stomatitis and ulceration of buccal, labial and palatal mucosa.

**Allergic**—May be caused by local application of antibiotics, or rarely by chemicals in dentures and tooth pastes. Allergic factors may also play a part in ulceromembranous gingivitis.

**Local manifestation of disease**—

1. Skin diseases—

(a) *Lichen planus*—Mouth affected in 50 per cent cases. Most common is atrophic or hyperkeratotic form, occasionally frankly ulcerative form. Two per cent chlortetracycline mouth wash for 3 days almost a diagnostic therapeutic test.

(b) *Pemphigus vulgaris*—Characteristic large flaccid bullae which are quickly traumatised to form ragged ulcers. May be associated with malignant disease of alimentary tract, lung or elsewhere. Benign mucous membrane pemphigoid rarely affects mouth alone, usually affecting the eye also.

(c) *Erythema multiforme*—Acute inflammatory process which generally involves skin, and ocular, genital and oral mucous membranes.

2. Systemic disease—Syphilis in secondary stage may be recognised by shallow ulcers with a thin whitish covering on mucous membrane of the mouth (snail-track ulcers or mucous patches).

## 3. DYSPHAGIA

**Causes:**

**A. Oropharyngeal dysphagia:**

1. *Neurogenic*—(a) 11th nerve lesions. (b) Bilateral UMN lesions: bilateral hemiplegia, multiple sclerosis, motor neurone disease. (c) LMN lesions: Motor neurone disease, bulbar polio, syringomyelia, polyneuropathy. (d) Muscular: Myotonia dystrophica, myasthenia gravis.

2 *Inflammatory*—Tonsillitis, pharyngitis, peritonsillar abscess, mumps, acute thyroiditis. Sideropenic dysphagia—Iron deficiency may cause atrophic glossitis and oesophagitis which may lead to formation of mucosal webs (Plummer-Vinson syndrome).

3. *Mechanical and traumatic*—Fish-bone in tonsillar bed or pyriform fossa, intervertebral disc degeneration with anterior osteophytic outgrowths.
4. *Neoplastic*—Postcricoid carcinoma, thyroid enlargement.
5. *Pharyngeal pouch.*
6. *Functional*—Globus hystericus.

**B. Oesophageal dysphagia:**

1. *Mechanical block*—Carcinoma oesophagus or cardia, oesophageal atresia or stricture. Mediastinal neoplasm, aortic aneurysm, aberrant great vessels (dysphagia lusoria).
2. *Muscular incoordination*—Achalasia, diffuse muscle spasm, systemic sclerosis, Chaga's disease.
3. *Oesophagitis*—Peptic, monilial.

## Investigation of a Case of Dysphagia

**I. History:**

1. *Age and Sex*—*Children*—cleft palate, foreign body or diphtheritic paralysis. *Young females*—hysterical spasm. *30-40*—Achalasia. *Menopause*—Sideropenic dysphagia. *Above 50*—Carcinoma oesophagus particularly in males.
2. *Symptoms*—
   (a) *Dysphagia*
   (i) *Onset*—Acute in foreign body, encephalitis, thrombosis of cerebellar artery or hysterical. Gradual in stricture, malignancy, achalasia, etc. Onset after shock or emotional upset common in achalasia. (ii) *Type of distress*—Difficulty in swallowing both liquids and solids particularly if there is nasal reflux suggests a *neurological condition.* Deglutition with strangulation or cough means central lesions of bulbar type, myasthenia gravis, or disease irritating 9th or 10th cranial nerves. Difficulty in transferring bolus of food from mouth to gullet is usually caused by *local disorders* of throat, pharynx or larynx. Sensation of food sticking retrosternally is as a rule due to *oesophageal abnormalities.* (iii) *Progress*—Long history with intermittent symptoms in achalasia. Dysphagia first with solids and subsequently fluids suggestive of mechanical obstruction. (iv) *Position at which food sticks*—provides a fairly accurate guide to the site of obstruction as the lesion is either at that level or higher up. (v) *Relation of distress to posture*—If distress at night when patient is in reclining position and relieved in

upright position, it suggests oesophageal hiatus hernia.

(vi) *Deglutition with strangulation or cough*—means central lesions of bulbar type, myasthenia gravis or disease irritating 9th or 10th cranial nerves.

(b) *Pain*—Epigastric in achalasia, burning substernal in oesophagitis, anginal in hiatus hernia.

(c) *Regurgitation*—Characteristic of long-standing achalasia; can occur with stooping or straining in hiatus hernia.

(d) *Hematemesis*—Oesophagitis, carcinoma.

(e) *Nasal twang*—and nasal regurgitation of fluids suggests palatal paralysis.

(f) *Hoarseness of voice*—in carcinoma of larynx.

3. *Past history*—(a) Of swallowing corrosives or of instrumentation suggests benign stricture formation. (b) Of psychoneurotic disorder may suggest globus hystericus (c) Of cholecystitis or peptic ulcer may point to reflex cardiospasm.

**II. Physical Examination:**

1. *Mouth and throat*—For stomatitis, malignancy tongue and abnormalities of pharynx.
2. *Neck*—Enlarged lymph glands, goitre, malignancy of thyroid.
3. *Chest*—For evidence of aneurysm, mediastinitis or mediastinal tumour, pericarditis, marked cardiac hypertrophy, empyema, and pulmonary abscess.
4. *Nervous system*—For evidence of bulbar paralysis or myasthenia gravis.
5. *Spine*—Cold abscess to exclude chronic retro-pharyngeal abscess.
6. *Anaemia and koilonychia*—in Plummer-Vinson syndrome.

**III. Investigations:**

1. *Laryngoscopy*—Ulceration or growth of larynx.
2. *Barium swallow*—Cardiospasm, stricture, growth, congenital shortening of oesophagus, oesophageal diverticulum.
3. *Barium meal*—For hiatus hernia or peptic ulceration.
4 *X-Ray chest*—Mediastinal tumour, aneurysm, mitral valve disease Evidence of lung infection from repeated aspiration in achalasia.
5. *Oesophagoscopy and gastroscopy*—Stricture, carcinoma or foreign body. In reflux oesophagitis the mucosa of the lowest part of gullet may be hyperaemic or ulcerated. Webs

and atrophic mucosa may be seen in Plummer-Vinson syndrome.

6. *Exfoliative cytology of the oesophagus*—May help in case in which a biopsy fails to demonstrate a neoplasm.

## 4. ACHALASIA OF THE CARDIA
### (Cardiospasm, Megaoesophagus)

**Definition**—A disorder occurring usually in the third decade, and slightly more in females and characterised by weak or absent peristalsis through lower oesophagus and failure of the relaxation of cardia in response to the peristaltic wave of swallowing then giving rise to impaired oesophageal emptying.

*Pathogenesis*—Degeneration of the ganglion cells of mesenteric plexus of the oesophageal wall causes complete disruption of organised motor activity in the smooth muscle part of the oesophagus. The cause of the degeneration is unknown and the changes are confined to the nerve supply of the alimentary tract.

**Clinical Features:**

1. *Dysphagia*—is the dominant symptom. Feeling of obstruction usually of the cardia or sometimes high in the oesophagus. Sensation of food sticking in the oesophagus at first intermittent, later continuous and at every meal. Greatest difficulty in drinking water.
2. *Regurgitation*—In initial stages, food regurgitated almost immediately following ingestion but as oesophagus becomes dilated, food and secretion may be retained for hours and days followed by delayed regurgitation.
3. *Pain*—Spontaneous retrosternal pain which occurs equally during night and day, is often severe and is relieved by drinking cold water. Other sensations may be bursting feeling provoked by drinking fast, or sensation of food sticking, and heart burn by lying down or stooping.
4. *Respiratory symptoms*—(a) Cough and dyspnoea due to pressure on trachea and bronchus by dilated oesophagus. (b) Aspiration may result in aspiration pneumonia, bronchiectasis or lung abscess.
5. *Asymptomatic*—Occasionally the condition is discovered as a mediastinal swelling on routine chest film

**Diagnosis:**

1. *Radiology*—Dilated oesophagus which takes on a cucumber shape, or sigmoid outline with conical narrowing of its lower

segment. Because of the block, the gastric air bubble is absent.
2. *Endoscopy*—Usually reveals a chronically inflamed oesophageal mucosa.
3. *Manometry*—Failure of lower oesophageal sphincter to relax on swallowing.

**Complications :**

1. *Pulmonary*—Fibrosis due to recurrent chest infection.
2. *Carcinomas*—commonest in mid-oesophagus due to irritation from chronic stasis.
3. *Arthropathy*—rare.

**Management :**

1. *Surgery*—Cardiomyotomy treatment of choice. It consists of longitudinal muscle splitting incision at the cardia which leaves the mucosa intact (Heller's operation).
2. *Oesophageal dilatation*—with a pneumatic bag placed correctly under radiographic control if surgery is contraindicated especially in older patients. Repeated dilatations are necessary.
3. *General*—(i) Maintenance of nutrition. (ii) Removal of food residues in oesophagus followed by lavage. (iii) Diet —semi-liquid or liquid Avoid ice cold food, spices and alcohol (iv) After a meal and half hour before retiring patient must drink at least one glass of water. (v) Measures to prevent regurgitation oesophagitis—The patient should not lie down for one to two hours after meals. Straining and chronic coughing should be controlled. Tight corsets should not be worn.

## 5. HIATUS HERNIA

**Etiology**—Most common in middle aged obese females. It may be congenital or due to conditions which raise intra-abdominal pressure e.g. obesity, pregnancy, ascites or abdominal tumours, or may follow surgical operations like partial gastrectomy or vagotomy.

**Types :**

1. *Sliding*—Commonest variety. Simple upward slide of stomach with oesophago-gastric junction through the hiatus into the chest.
2. *Rolling* (Para-oesophageal)—The oesophago-gastric junction is fixed below the diaphragm and a part of the stomach herniates through the hiatus besides the oesophagus.

**Clinical Features:** Although hiatus hernia and symptomatic gastro-oesophageal reflux commonly go together, disabling reflux can occur in absence of demonstrable hernia e.g. in old age.

1. *Symptoms due to reflux*—(a) Retrosternal chest pain or discomfort especially on stooping or lying down soon after meals. (b) Heart burn or regurgitation of acid fluid, or food on bending or stooping. Nocturnal regurgitation may cause choking attacks and aspiration pneumonia. (c) Dysphagia due to oesophageal musclespasm or oesophagitis.
2. *Symptoms due to pressure*—either of dilated oesophagus and/or gastric pouch on surrounding structures—(a) From pressure on mediastinum—Dyspnoea, palpitation, cough, anginal pain. (b) From pressure on diaphragm—Hiccup, spasmodic pain.
3. *Symptoms due to hemorrhage*—Iron deficiency anaemia due to massive hematemesis or oozing from oesophageal ulcers.
4. *Symptoms due to associated diseases*—Peptic ulcer at level of diaphragmatic hiatus, cholecystitis, coronary artery disease.

**Diagnosis:**

1. *Radiology*—Barium meal examination with patient in head down or stooping position may reveal reflux and hiatus hernia.
2. *Endoscopy*—Mainly of value in assessment of oesophagitis and of consequent bleeding, ulceration and stricture formation.
3. *Oesophageal acidity*—most accurate means of measuring reflux but time-consuming.

**Management:**

A. Medical—

1. *To minimise reflux*—Patient should avoid lying flat, stooping and bending forwards, or sitting in a low chair and work which involves posture precipitating reflux. The bed should be tilted by using 20 cm. blocks under the head end of the bed. Small frequent feeds of bland diet.
2. *Reduce gastric acidity and pepsin secretion*—with cimetidine, or antacids.
3. *Increase tone of lower oesophageal sphincter*—Metoclopramide 10 mg thrice daily.
4. *Stop smoking.*
5. *Correct obesity.*

B. Surgical—Restoration of intra-abdominal segment of oesophagus into abdomen and anchoring it, repairing the hiatus and

enveloping the lower oesophagus by gastric fundus (fundoplication). *Indications*—1. Not adequate symptomatic relief after six months of conservative treatment, or unwillingness to continue such treatment. 2. Development of complication—ulcer oesophagitis or incarceration, or strangulation of hernia. 3. Nocturnal aspiration of regurgitated material into lungs with resulting pneumonia.

## 6. DYSPEPSIA

**Classification of causes:**

1. *Organic disease*—or abnormalities of oesophagus, stomach or duodenum, e.g., cardiospasm, tumour of oesophagus, diaphragmatic hernia, achlorhydria, gastritis, peptic ulcer, carcinoma stomach.
2. *Reflex dyspepsia*—due to disease of appendix, gall-bladder, pancreas or intestines—appendicitis, cholecystitis, pancreatitis, amoebiasis, sprue, spastic colon, intestinal worms especially giardiasis.
3. *Systemic disease*—Cardiac failure, pulmonary tuberculosis, anaemia, Addison's disease, uremia, hyperparathyroidism.
4. *Functional*—Faulty habits of eating, nervous exhaustion, anxiety and/or depression.

**Investigation of a case:**

**I. History—**

1. Mode of onset—Sudden years ago in appendicitis. After shock or bereavement.
2. Duration of symptoms—Long history with intervals of freedom in peptic ulcer. Short history in malignancy.
3. Type of pain and time of onset—Discomfort rather than pain in cholecystitis, chronic gastritis, early cancer of stomach. Vague discomfort in lower abdomen in intestinal flatulence.
4. Loss of appetite—marked in cancer and cirrhosis.
5. Nausea—Chronic gastritis and nervous dyspeptic.
6. Vomiting—at intervals of many hours and copious suggests organic disease.
7. Hematemesis—in peptic ulcer, carcinoma, gastritis, cirrhosis of liver, etc.
8. Bowels—Constipation in duodenal ulcer, gastric carcinoma, pyloric stenosis, chronic appendicitis, visceroptosis, and chronic cholecystitis. Diarrhoea in nervous states, colitis, pancreatic insufficiency, etc. Alternating diarrhoea and constipation in cancer of colon, diverticultis and stricture of

colon. Dark coloured motion in absence of treatment with iron or bismuth suggestive of melena.

9. Water brash and heart burn—common in peptic ulcer.
10. Flatulence—often in chronic cholecystitis. Aerophagia in nervous dyspeptic.

*Personal history*—Environmental factors, occupation, e.g. handling of lead or other toxic materials, hours of work, regularity of meals.

*Family history*—of duodenal ulcer and cholecystitis.

**II. Physical Examination—**

1. General appearance—Fat in gall-bladder dyspepsia; nervous dyspeptic usually thin; pallor in pernicious anaemia.
2. Dental caries, condition of tongue.
3. Abdomen—Distension, peristalsis, localised tenderness, palpable mass, enlargement of liver, etc.
4. Examination of heart and lungs if cough or dyspnoea.
5. Wasting in anorexia nervosa, Addison's disease, tuberculosis or malignancy.

**III. Radiological Examination—**

Diagnosis of peptic ulcer, carcinoma stomach, achalasia, chronic appendicitis, regional ileitis, hiatus hernia, gall-stones.

**IV. Laboratory Investigations—**

(a) Gastric analysis.
(b) Stool examination for cysts, ova, incomplete digestion, occult blood.
(c) Urine examination and renal function tests.
(d) Red cell count, hemoglobin and hematocrit estimation.
(e) Absorption studies of small-bowel function.
(f) Liver function tests.
(g) Needle biopsy of the liver.
(h) Pancreatic function tests.
(i) Tests of endocrine disorders—such as diabetes mellitus, Addison's disease, hyperthyroidism or hyperparathyroidism.

**V. Investigation by Instruments—**

Endoscopy, colonoscopy and laparoscopy.

**VI. Exploratory laparotomy—**

If a definite diagnosis is not possible after all other investigations are carried out.

## 7. GASTRIC FUNCTION TESTS

### Gastric Analysis

**Indications:**

1. To determine whether patient can secrete any gastric acid —Useful—(a) In patients with neurological signs and macrocytic anaemia or other signs and symptoms of pernicious anaemia. (b) Patient suspected of suffering from pernicious anaemia but who has been treated with vitamin $B_{12}$ before establishment of diagnosis. (c) Exclusion of simple peptic ulcer in a patient with suspicious ulcerating lesion of stomach.
2. To measure the amount of acid produced by a patient with suspected duodenal or postoperative stomal ulcer who has no radiologically demonstrable lesion.
3. To reveal the presecretory phase characteristic of Zollinger-Ellison syndrome.
4. To determine the completeness of vagotomy by insulin test.
5. To determine the proper type of surgical procedure for peptic ulcer.

**Contraindications** (to gastric intubation)—1. Patients with oesophageal varices, diverticula, stenosis or malignant neoplasms of oesophagus. 2. Aortic aneurysm. 3. Recent severe gastric haemorrhage. 4. Congestive heart failure. 5. Pregnancy.

**Examination of gastric contents:**

**Physical examination—**

*Volume*—Fasting volume varies upto about 50 ml. Following overnight fast a gastric residue of 250 ml. or more suggests delayed gastric emptying, often from pyloric obstruction.

*Odour*—Normal gastric juice has a faintly pungent odour. A foul and acrid smell suggests pyloric stenosis, offensive faecal smell intestinal obstruction or gastro-colic fistula and ammoniacal smell uremia.

*Bile*—Bile gives a yellowish green colouration and is occasionally regurgitated in the normal stomach and frequently accompanies excessive gagging during intubation. Large amount of bile may be present with obstructing lesions of the small intestine distal to ampulla of Vater.

*Mucus*—Normally present and is largely responsible for viscosity of gastric secretion.

*Blood*—Streaks of blood may be seen due to minor trauma during intubation. Blood in greater amount and of longer duration is brown and granular (coffee ground), and may occur

from gastric lesion such as gastritis, ulcer or carcinoma, or may be swallowed from mouth, oesophagus or lungs.

**Microscopic examination—**

*Erythrocytes*—Small number of no significance.

*Leucocytes*—Small numbers present in normal gastric juice. Increased numbers may result from inflammation of gastric mucosa, mouth, paranasal sinuses and nasorespiratory tract, or less commonly from pancreas, biliary tract, or duodenum.

*Epithelial cells*—Normally in small numbers. Gastritis may result in significant number of columnar epithelial cells.

*Crystals*—In an occasional case of cholelithiasis cholesterin crystals may be seen.

*Parasites*—May be found with reflux of duodenal contents. Giardia lamblia trophozoites or cysts, strongyloides larvae, or ascaris or hookworm ova may be found.

**Chemical examination—**

*Gastric acidity and pH Method :—*

1. Overnight fast. No anticholinergics for 24 hours. No antacids on that day.
2. Patient's throat and one nostril are sprayed with 1-2% lignocaine.
3. A radio-opaque plastic tube with holes close to the tip (Levine type) is passed through the nose and the patient examined fluoroscopically to check that the tip of the tube is in the most dependent part of the stomach. If screening is not possible make patient swallow 20 ml water, recovery of atleast 15 ml indicates reasonable positioning.
4. The stomach is emptied using a 50 ml. syringe.
5. The tube is taped on the patient's face and he is made to lie on the left. Check that gastric emptying is complete.
6. The test proper is begun by starting aspiration at every 15 minute intervals.

TESTS AND INTERPRETATION

**Basal acid output (BAO) :**

Collect the secretions in four 15 minute samples. Normal values: Men 2 mmol/hour, women 1 mmol/hour. In duodenal ulcer the values are twice the normal, but in gastric ulcer similar to normal range. BAO above 15 mmol/hour suggests sustained hypersecretion of Zollinger-Ellison syndrome. Gastric function tests are of no value in diagnosis of gastric ulcer.

*Achlorhydria* is defined as a condition where the acidity is never greater than pH 3.5. *Causes* of achlorhydria (or hypo-

chlorhydria)—Gastric carcinoma, gastric ulcer, pernicious anaemia, atrophic gastritis, gastric polyposis, subtotal gastrectomy, iron deficiency, pregnancy, old age or debility, pellagra, and radiation. It is found in about 3 per cent of normal adults.

**Pentagastrin stimulated peak acid output (PAO):**

Give pentagastrin 6 mcg/kg IM and collect secretions for further 60 minutes in four 15 minute successive samples. PAO is calculated from the highest two consecutive acid output collections. Mean PAO—Males 25 mmol/hour, women 12 mmol/hour. Interpretation—PAO is increased in duodenal ulcer. A high PAO with normal BAO is suggestive of duodenal ulcer. Complete anacidity in the apparent presence of an ulcer makes gastric cancer likely.

**Insulin stimulation:**

Blood is collected for sugar estimation and immediately afterwards soluble insulin 0.2 u/kg is injected. Eight 15 minute samples of gastric juice, and two venous blood samples 30 to 45 minutes after insulin injection are collected. *Interpretation*—Criteria for positive test are—(a) Increase of 20 mmol/1 in titratable acidity in any two consecutive 15-minute samples after insulin compared with any similar pair before insulin. (b) Any increase in aspirated volume in the postinsulin hour compared with the preinsulin hour. (c) Acid output in any one hour after insulin more than acid output in the basal hour. A positive insulin test suggests an incomplete vagotomy.

**Miscellaneous studies—**

1. *Mycobacterial culture*—Aspiration of gastric contents for mycobacterial culture indicated in patients who are suspected of having pulmonary tuberculosis, but who are unable to produce adequate sputum samples, particularly young children
2. *Examination of aspirate for malignant cells*—is time-consuming.
3. *Serum gastrin*—Raised plasma gastrin in—(a) Achlorhydria Gastrin levels may be increased 100 times. (b) Megaloblastic anaemia. (c) After gastric surgery if a bypassing enterostomy has effectively excluded the antrum from contact with gastric juice. (d) In duodenal ulcer patients gastrin levels may be only slightly elevated. (e) Zollinger-Ellison syndrome.
4. *Tests for bile contamination*—Gastric aspirates in patients with gastric ulcer are frequently bile-stained.

## 8. GASTRITIS

### Acute gastritis

**Definition:** The term is often used to describe dyspeptic symptoms in patients who have no visible ulcer, but its use is better reserved for the description of specific histological abnormalities of gastric mucosa. No specific pattern of symptoms correlates with histological gastritis.

VARIETIES:

1. *Acute exogenous gastritis*—due to (a) Alcohol. (b) Drugs such as salicylates, butazolidine, indomethacin. (c) Staphylococcal endotoxin (acute gastro-enteritis). (d) Corrosive agents—strong acids, caustic alkalis, iodine, copper salts.
2. *Acute endogenous gastritis*—(a) Infectious—acute infections such as pneumonia, influenza. (b) Suppurative—as a complication of bacteremia secondary to a septic process elsewhere in the body usually streptococcal or secondary to ulcerative lesions in the stomach. (c) Allergic.

SYMPTOMS—vary with cause and severity. Onset acute. Nausea, vomiting and abdominal discomfort or cramp like pain in the upper abdomen. Anorexia and at times heartburn. Acute gastritis with hematemesis and melena is most commonly due to aspirin.

MANAGEMENT:

(a) Of cause—Specific chemotherapy for acute infections, antidotes for corrosive poisons.
(b) Diet—Mainly fluids.
(c) Drugs—Antiemetics like triflupromazine IM for vomiting, Sedatives. IV fluids if required.

### Chronic gastritis

**1. Chronic superficial gastritis**—due to excessive consumption of tobacco, alcohol and hot drinks.

SYMPTOMS:

1. Ulcer like syndrome.
2. Cancer like syndrome—Symptoms suggesting malignancy of stomach.
3. Massive stomach haemorrhage.
4. Vague epigastric discomfort, nausea, anorexia and post-pharyngeal accumulation of mucus.
5. Gastrogenous diarrhoea.
6. Acute abdomen following indulgence in alcohol.
7. "Sensitive stomach"—Symptoms induced by dietetic errors.

*X-ray*—(a) Tubular stomach with greater and lesser curves roughly parallel. (b) 'Bald' fundus with absent mucosal folds. (c) Thick mucosal folds on greater curvature.

MANAGEMENT :

1. Bed rest in acute cases with severe pain. Gastric lavage and hot packs.
2. Elimination of possible underlying causes, e.g., alcohol, spices, hot foods. Proper mastication of food. Ulcerogenic drugs to be avoided.
3. Treatment of anaemia in long standing gastritis.
4. For achlorhydria—1 to 2 teaspoonfuls of dilute HCl in glass of fruit juice sipped with meals.
5. For pain—Ulcer regime with small feeds. Topical anaesthetics like lignocaine 10 mg. with one teaspoonful of aluminium hydroxide t.d.s. may relieve pain.
6. For bleeding—Ice water lavage and other measures for treatment of hematemesis.

2. **Chronic atrophic gastritis**—Here in addition to cellular infiltration of the mucosa (as in chronic superficial gastritis), there is also loss of gastric glands with reduction in acid-pepsin secretion. Its causes are unknown and it is asymptomatic. In some patients complete atrophy of pernicious anaemia supervenes.

## 9. PEPTIC ULCER

**Definition:** The term peptic ulcer applies to mucosal ulceration near the acid bearing regions of the gastrointestinal tract. Most ulcers occur in the stomach or proximal duodenum, but they may also occur in the oesophagus (due to acid reflux), in jejunum (at site of gastrointestinal anastomosis), and rarely in relation to ectopic gastric mucosa (near a Meckle's diverticulum).

**Etiology and pathogenesis:**

1. *Age*—Any. Duodenal maximum 4th decade, gastric 5th decade.
2. *Sex*—More in males, gastric 2-3:1, duodenal 6-12:1.
3. *Genetic factors*—Peptic ulcer tends to run in families Two specific factors identified are—(a) *Parietal cell mass* —Larger parietal cell mass with increased gastric acid output in patients with duodenal ulcer perhaps represents an inborn characteristic of the individual. (b) *Blood groups and blood antigens*—Those with blood group O and

those unable to secrete their blood group substances into their saliva and gastric juice have greater liability to ulceration.
4. *Smoking*—Incidence of peptic ulcer is lower in non-smokers.
5. *Personality*—Incidence of duodenal ulcer higher in anxiety prone personalities and in people with responsible jobs.
6. *Association with other diseases or known factors*—Higher incidence in patients with emphysema and cor pulmonale, rheumatoid disease, polycythemia, cirrhosis, Cushing's syndrome, hyperparathyroidism. Drug induced ulcers—Salicylates, steroids in high doses, phenylbutazone, indomethacid, colchicine, tolbutamide. Severe burns, septicemia.
7. *Location*—In those portions of digestive tract exposed to action of gastric juice—lower portion of oesophagus, lesser curve of stomach and first part of duodenum.

**Theories of causation**—For sake of convenience ulceration is regarded as the result of an imbalance between erosive forces of acid-pepsin digestion and mucosal resistance.

**Aggressive factors**—

(1) ACID-PEPSIN—"No acid, no ulcer".
  (a) *Overactivity of vagus*—Complete transection of vagus nerve abolishes hypersecretion.
  (b) *Lack of inhibition*—(a) In cirrhosis of liver increased frequency of ulcer possibly due to inability of damaged liver to detoxicate histamine absorbed from gut. (b) In renal dialysis patients probably because of defective removal of circulating gastrin.

(2) HORMONAL FACTORS: (a) *Adrenal gland*—ACTH and corticosteroids can, after prolonged administration, stimulate gastric secretion in man. (b) *Pancreatic*—Gross sustained hypersecretion of acid due to ulcerogenic substance or hormone with non-insulin secreting islet cell tumours of pancreas (Zollinger-Ellison syndrome). (c) *Parathyroid gland*—Hypercalcemia causes increased gastrin release and hence acid hypersecretion and may explain the relationship between peptic ulcer and hyperparathyroidism. (d) *Oestrogens*—Pregnancy influences peptic ulcer favourably while menopause does so adversely. Premenopausal women relatively immune to peptic ulcer. Stilboestrol effective in treatment of duodenal ulcer in men. (e) *Local*—Antral hormone

gastrin, result of gastric stasis, considered through its excessive production to be important factor in etiology of gastric ulcer.

(3) ENVIRONMENTAL FACTORS:

(a) *Emotional stress*—(i) Emotional stress produces significant increase in total acid output of gastric secretion. Air-raid ulcers during World War II among civilians in heavily bombed cities presumably due to emotional stress. (ii) *Social class*—Gastric and duodenal ulcers seem to be more common in poor people. (iii) Other stressful stimuli such as surgical operation, burns, trauma.

(b) *Drugs*—Salicylates, phenylbutazone and corticosteroids may exacerbate previously existing ulcers.

(c) *Food*—Differing national and regional dietary habits. Spices and temperature of ingested food may influence.

(d) *Tobacco*—Smoking can influence peptic ulcer by possible effects on gastric motility and secretion.

**Defensive factors**—

(1) *Mucosal resistance*—Property of mucosa to resist erosion by acid and pepsin. Best demonstrated by effect of emotion in raising or lowering threshold of mucosal capacity to cope with erosive action of acid-pepsin.

(2) *Mucus*—Alteration in gastric mucus qualitatively or decrease quantitatively impairs mucosal defensive mechanisms and so increases potential of ulcer formation.

(3) *Local mucosal blood flow*—Decreased mucosal resistance as result of diminished blood flow due to local venous stasis (e.g., cirrhosis of liver) or general circulatory disorders.

(4) *Intrinsic mechanisms that inhibit gastric secretion*—(a) Gastrin liberation from antral mucosa influenced by pH in antrun, acid reaction inhibiting its release. (b) Gastric secretory-inhibitory mechanism situated in duodenum (duodenal brake) when impaired by duodenal disease results in gastric hyperactivity.

## DUODENAL ULCER

**Symptoms—Pain:**

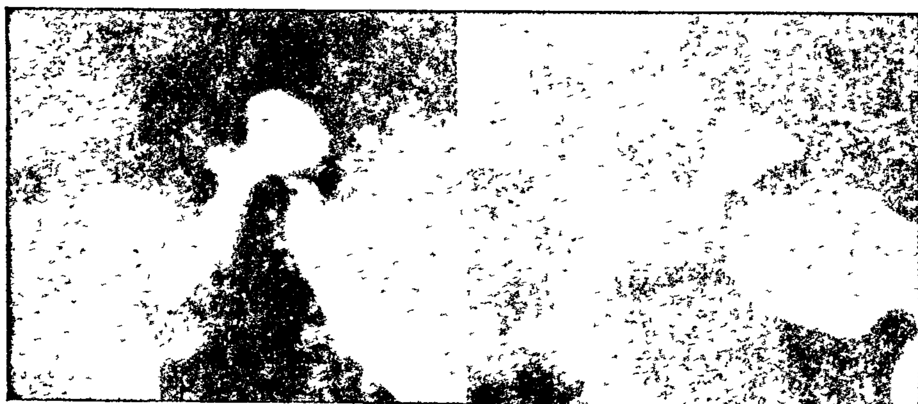
1. *Character and intensity*—Variable, usually gnawing, moderate, very mild or severe.
2. *Location and radiation*—Characteristically sharply circumscribed to an area about one inch in diameter between



Carcinoma of oesophagus
Barium swallow showing filling defect



Achalasia of the cardia
Barium swallow shows dilated oesophagus with rapid narrowing of oesophagogastric junction



A

B

A —Duodenal ulcer, crater or niche indicated by arrow
B —Disappearance of the crater with residual deformity of the bulb



Large lesser curvature stomach ulcer with spastic hourglass deformity Note projection of barium beyond margin of the organ



Filling defects and irregular mucosal pattern after barium swallow due to oesophageal varices




CT scan in a patient with liver cirrhosis Note ascitic fluid (A), small irregular liver (L) and spleen (S)

xiphoid and umbilicus. Can occur anywhere in the abdomen, retrosternally, or with a posterior ulcer in the back.
3. *Relation to food*—Rhythmic occurrence and disappearance. Pain invariably absent in morning. Pain usually comes 2-3 hours after meals and is eased by food. Characteristic nocturnal distress between 12 and 2 a.m. Freedom from pain for about two hours after rising.
4. *Aggravation and relief*—Aggravated by coarse foods, alcohol, nervous tension, undue fatigue. Relief by antacids or after vomiting of acid fluid.
5. *Periodicity of pain*—Most characteristic feature. Even when pain is absent, recurrent bouts of heartburn, anorexia, nausea and vomiting suggest possibility of ulcer.

**Variations in clinical picture:**

1. *From high pain threshold*—Little or no pain, only sensation of fullness or bloating.
2. *Increased reflex activity in gastrointestinal tract*—(a) Oesophageal spasm—Excessive salivation and acid regurgitation (water brash). (b) Pylorospasm—Heartburn. (c) Colonic spasm—Features of irritable colon syndrome—Constipation, abdominal pain not related to food and most marked on left side of abdomen.
3. *From complications*—(a) Penetrating ulcer—may cause continuous pain, pain in unusual sites such as back or shoulder and refractoriness to agents formerly yielding prompt relief. (b) Bleeding—acute hematemesis, or anaemia due to insidious bleeding. (c) Pyloric obstruction—Nausea, anorexia, loss of weight and vomiting. (d) Perforation of ulcer—into lesser sac may cause backpain, malaise and fever.
4. *Postbulbar ulcer*—Mostly back pain, or insidious bleeding.
5. *From associated disease*—such as gallstones or hiatus hernia.
6. *From neurosis*—Multiple gastro-intestinal symptoms due to anxiety.

**Signs :**

"The history is everything, the physical examination nothing."

1. *Tenderness*—Deep tenderness to the right of the midline in epigastrium. Localised over the site of lesion on deep palpation. Superficial tenderness may be present.
2. *Muscle guarding or rigidity*—may be present with active ulcer or deeply penetrating ulcer.

3. *Peristaltic waves*—may be observed in presence of obstruction. Gastric splash may suggest gastric retention due to duodenal ulcer near pylorus.
4. *Occult blood*—in stools.

**Investigations:**

1. *Barium meal*—The appearances may be one of following—(i) Duodenal ulcer crater or distortion of duodenal cap by spasm or mucosal swelling. (ii) Scar tissue may modify shape of the bulb. (iii) Cap may be greatly reduced in size or it may be irritable and empty itself of barium quickly. The cap is often tender on manual pressure.
2. *Endoscopy*—Shows that 10-15% of patients with X-ray negative dyspepsia have peptic ulcer.
3. *Gastric acid studies*—High acid output as a rule.
4. *Serum gastrin estimation*—if features of Z.E. syndrome. Serum gastrin 10 times normal or more.

**Complications:**

1. Bleeding.
2. Perforation—Acute, or chronic perforation into surrounding organs—pancreas, liver, bile duct, colon.
3. Pyloric stenosis.
4. Malignancy at site of ulcer.

## D.D. OF DUODENAL ULCER (Epigastric pain)

**I. Gastric lesions:**

1. *Chronic gastric ulcer*:

| | *Chronic gastric ulcer* | *Chronic duodenal ulcer* |
|---|---|---|
| 1. Pain : | | |
| (*a*) Onset .. | Soon after meals | 2-3 hours after meals. |
| (*b*) Sequence ... | Food-comfort-pain-comfort rhythm | Pain-food-ease sequence. |
| (*c*) Site ... | Mid-epigastrium | Right half of epigastrium or right hypochondrium. |
| (*d*) Radiation to back .. | Common | Rare. |
| (*e*) Relief ... | By spontaneous vomit or antacids | By taking food. |
| 2. Gastric analysis .. | High PAO with normal BAO suggestive | Of no value. |
| 3. Barium meal ... | Constant ulcer crater usually on lesser curvature with spasm of immediate opposite greater curvature and distortion of mucosal folds which approximate each other at the edges of the ulcer. | Persistently deformed duodenal cap with or without ulcer crater. |

2. *Gastric carcinoma:*

| | *Peptic ulcer* | *Gastric carcinoma* |
|---|---|---|
| Age ... | About 40 | After 50. |
| Duration of disease | Long history | Short history. |
| Periodicity ... | Characteristic | Rare. |
| Relief with food or alkali ... | Common | Occasional. |
| Presenting symptom ... | Intermittent pain | Anorexia and nausea prominent |
| Faecal occult blood . | Disappears after 2-3 weeks treatment | Continuously present |
| Gastric analysis | Increased acidity common | Hypochlorhydria common, cancer cells. |
| E.S R. ... | Usually normal | Often raised. |
| Gastroscopy ... | Oedema and spasm. Rugal convergence | Irregular margins of ulcer. Lack of peristalsis |
| Barium meal : | | |
| (*a*) Location and size of ulcer crater | 90% lesser curvature. Large crater | More than 50% greater curvature; crater not large. |
| (*b*) Depth of niche .. | Ulcer niche projects well beyond line of lesser curvature | Ulcer appears shallow and is often within the line of lesser curvature. |
| (*c*) Contour of niche . | Smooth outline | Irregularity of contour common. |
| (*d*) Mucosal pattern | Radiating mucosal folds converge towards edge of ulcer crater | Mucosal folds terminate abruptly slight distance from free margin of lesion. or nodulation of mucosal pattern in region of ulcer. |
| (*e*) Spastic phenomenon .. | Smooth spastic incisura on greater curvature | Broad and irregular incisura-like defect may be seen on greater curvature |

3. *Chronic gastritis:*

| *Chronic gastritis* | *Peptic ulcer* |
|---|---|
| Pain slight, more soreness | Pain usually severe |
| Pain intensified by food | Food may relieve pain. |
| Pain relatively constant | Intermissions |
| Symptoms of indigestion marked | Few symptoms of indigestion |
| Slight or no haemorrhage | Profuse hematemesis |
| X-Ray—No ulcer | X-Ray—Ulcer. |

**II. Duodenal lesions:**

1. *Pseudo-ulcer syndrome* (Pyloroduodenal irritability)—Discomfort later after meals, relieved temporarily by food or alkalis, and in many cases typical periodicity of remissions and relapses. Often hyperchlorhydria. X-ray studies show pylorospasm and extreme irritability of duodenal cap. No evidence of ulcer.
2. *Duodenitis*—Often no pain but nausea and sensation of fullness in upper right part of abdomen. Maximum intensity several hours after ingestion of food Symptoms are usually not intermittent but continuous.
3. *Duodenal diverticula*—Pain in epigastrium may arise ½ to 2½ hours after meals. Not relieved by diet or alkalis. Diverticula seen on barium meal X-ray.
4. *Carcinoma of duodenum*—Very rare. Older patient. Symptoms of short duration and severe. No intermittency of symptoms; no relief by medical treatment. Later signs of obstruction, haemorrhage or jaundice. Mass may be felt.

**III. Gall bladder disease:**

*Chronic cholecystitis*—Vague upper abdominal distress and fullness after meals. Belching and eructations. Intolerance of fat. Attacks of epigastric pain with tenderness over gall-bladder. No occult blood in stools. Biliary colic and jaundice due to complicating gall stones. Symptoms tend to be more irregular and less periodic. Radiological investigation and ultrasound confirm diagnosis.

**IV. Pancreatic disease:**

(1) *Chronic pancreatitis*—Pain usually upper abdominal, bores through the back and often persists for many hours or days. Attacks of pain may be precipitated by alcohol or heavy meals. Certain postures such as sitting with the spine flexed, or lying in bed with knees tightly drawn up into the abdomen (jack-knife position) may help to relieve the pain. There may be associated malabsorption. Diagnosis depends on characteristic changes on ERCP and pancreatic function tests. Abdominal radiograph may show pancreatic calcification.

(2) *Carcinoma of pancreas*—Midepigastric pain steady and dull, or paroxysmal colicky pain. Relief from pain may be obtained by stooping or bending. Jaundice may be present. Weight loss and anorexia. Rapidly progressive. Evidence of metastasis in liver or elsewhere. Gallbladder may be palpable in about 10% cases.

**V. Diseases of colon:**

1. *Carcinoma*—Pain on right side below level of umbilicus. Lump may be palpable. No response to medical regime. Filling defect on X-ray.
2. *Chronic appendicitis*—Dyspepsia more or less continuous. Irregular short attacks of sharper pain. Nausea common. Vomiting. Pain worse on exertion, unrelated to ingestion of food. Pain midepigastric but often radiates to right iliac fossa.
3. *Ileo-caecal tuberculosis*—may produce reflex dyspeptic symptoms. Constipation alternating with diarrhoea. Thickening or lump in right iliac fossa.
4. *Irritable bowel syndrome*—Postprandial type of pain related to meals may occur. Pain often relieved by defaecation. May be accompanied by abdominal fullness, bloating or flatulence. Alternating constipation and diarrhoea in majority. Faeces characteristically ribbon-like with often excessive mucus.

**VI. Superficial or radicular pain:** Pain usually constant. Hyperaesthesia of abdominal skin. Flexion of abdominal wall reveals situation of pain.

**VII. Nervous dyspepsia:** Nervous, tense, restless type of patient. Symptoms usually daily. Dyspepsia may show qualitative food relationship and even milk may cause distress. Distress may start while eating. Forceful belching common. Pain produced by stress.

**VIII. Miscellaneous:**

1. *Hiatus hernia*—Chronic heart burn, intermittent regurgitation, dysphagia and substernal or epigastric pain aggravated by stooping or lying flat. Duodenal ulcer is often found with hiatus hernia which is also more common in women. Barium examination will show intrathoracic herniation of stomach.
2. *Ankylostomiasis*—Mild but continuous epigastric pain or discomfort. Anaemia. Hookworm ova in stool.
3. *Epigastric hernia*—Eructations, nausea and vague abdominal discomfort. Epigastric pain may be aggravated or relieved by change of posture. Hernia in the linea alba above the umbilicus.
4. *Visceroptosis*—Symptoms variable and many. Pain worse after food. Pain arises during meals and increases as more food is taken. Accompanying sensation of fullness, distension, feeling of weight or dragging in epigastrium. Discomfort persists for hours often with belching and regurgita-

tion. Alkalis without effect. Weak abdominal wall. Glenard's test—On standing behind the patient, raising lower abdomen with both hands and holding it up in that position, there may be some relief.

5. *Abdominal angina*—due to chronic intestinal ischemia. As in effort angina, the pain of intestinal ischemia develops with maximal work load following meals: (i) Occurs usually in patients over 40 years of age. (ii) Postprandial abdominal pain, usually cramping and referred to the back, develops 20 to 30 minutes after meals and lasts 1 to 2 hours. (iii) Progressive weight loss due to anorexia and malabsorption. (iv) Constipation common, may be interrupted occasionally by steatorrhoea. (v) Central abdominal bruit with at times absent peripheral pulses. (vi) X-ray studies with barium may show puddling of barium in small bowel as a result of impaired motility. (vii) Stool—excessive fat and often occult blood. (viii) Aortography with exposure of the film in the lateral projection will demonstrate the occlusive process in the coeliac and superior mesenteric arteries.

**Medical management of peptic ulcer:**

*Indications*—1. Short history (less than 5 years) and few relapses. 2 Mild symptoms. 3. Good social and economic position 4. No radiological evidence of penetrating ulcer, pyloric stenosis or marked duodenal deformity. 5. General condition unsuitable for surgery. 6. Few chances of recovery after removal of organic lesion due to marked neurosis.

1. **Rest:** Physical and mental. Rest in bed during acute phase and for one week after subsidence of pain.

*Indications for hospitalization*—(i) Tarry stools or strongly positive occult blood reaction. (ii) Constant pain replacing previous ulcer rhythm. (iii) Gastric retention. (iv) Uncontrollable night pain or vomiting. (v) Suspicion of impending perforation.

2. **Diet:** Bland. Modified Sippy diet. Duration of particular phase of diet will depend on severity of symptoms, constitution, response to treatment and co-operation of patient. Two hourly feeds throughout the day—small, digestible, but of adequate caloric value form the basis of treatment.

3. **Antacids:** 2 to 2½ hour after feeds. Aluminium hydroxide and magnesium trisilicate given separately or in combination in doses of 1 to 2 gms. in form of suspension or tablets.

Bismuth salts—Tri-potassium di-citrato bismuthate is thought to work by coating the ulcerated duodenal mucosa. 5 ml diluted

with water should be taken atleast ½ hour before meals and at bed time.

4. **Hyposecretory agents:**
   (a) *Anticholinergics*: Synthetic substitutes of belladona like propantheline (probanthine) 15 mg. or oxyphenium (antrenyl) 5 mg. t.d.s. or q.d.s. or larger doses to tolerance ½ hour before meals and at bed time. Side effects—Dry mouth, blurred vision, difficulty in urination, constipation, fatigue, rarely skin rash. Contraindications—Glaucoma, prostatic hypertrophy, cicatricial duodenal stenosis, achalasia, organic pyloric obstruction, coronary insufficiency and cardiac decompensation.
   (b) *Histamine $H_2$ receptor antagonists—Cimetidine*—200 mg three times daily with meals and 400 mg. at bed time or 400 mg. twice a day. This is continued for 4 to 6 weeks, and then may be either stopped or maintenance dose of 400 mg. at bed time may be continued for further 6-12 months. Side effects—Minor abnormalities of liver function, gynecomastia, and rise in serum urea and creatinine.

5. **Mucosal barrier strengtheners**—*Liquorice derivatives—Carbenoxolene*: 50 mg. t.d.s. after meals. Time release capsules for duodenal ulcer. Common side effects are salt and water retention and hypokalemia and sometimes rise of B.P. Deglycyrrhizinated liquorice has advantage of being substantially free from side effects and is of value in the elderly and those with cardio-respiratory disease.

6. **Sedatives and psychotherapy:** Luminal 30-60 mg. or chlor diazepoxide 5 mg. t.d.s. to relieve anxiety; may be combined with antispasmodics. Large doses if necessary for sleep during acute phase.

7. **Avoidance of gastric irritants and stimulants**—Tobacco, alcohol, coffee, tea, meat extracts, ulcerogenic drugs.

REGIME FOR ACTIVE ULCER:

(a) *First 2 weeks*—4 oz. or a small teacupful of ordinary or homogenized milk hourly from 7 a.m. to 10 a.m. Sugar, lactose or skim milk powder or cream or flavouring may be added. Milk of magnesia may be taken when constipated. Antacid should be given every hour on the half hour throughout waking hours and before retiring. If awakened during night, a milk feed and antacid should be taken. Anticholinergics q.d.s. at 4 hourly intervals.

(b) *3rd week*—Add to above one egg, cream of wheat, corn starch, strained soup (except onion and tomato), custard or jelly, mashed potatoes.

(c) *4th-8th week*—
Breakfast—Milk 1 glass; cereal with cream and sugar; soft boiled egg; bread and butter.
Midmorning—Milk 1 glass; orange juice; bread, cake or jelly.
Lunch—Milk 1 glass; soft boiled or poached egg; mashed potato, bread and butter, pudding, ice cream, stewed fruit.
Midafternoon—Same as midmorning.
Supper—Same as lunch.
Bedtime—Milk 1 glass; biscuits.

(d) *After 8th week*—
(1) Plain diet for another 4 months. (2) Frequent meals preferably every 2-3 hours. (3) Antacids for another 3-4 weeks in decreasing amounts.

OTHER METHODS OF THERAPY:

*Intragastric drip*—through intragastric tube for 12-hour night period or continuously. 100 ml. of aluminium hydroxide with 300 ml. warm water and added milk. 2,000-3,000 ml. of milk with antacid can be given in 24 hours. Contraindicated in presence of pyloric obstruction.

*Gastric irradiation*—in older persons with peptic ulcer despite careful medical management and in patients unfit for surgery. In many cases acid secretion diminishes by more than half within six weeks.

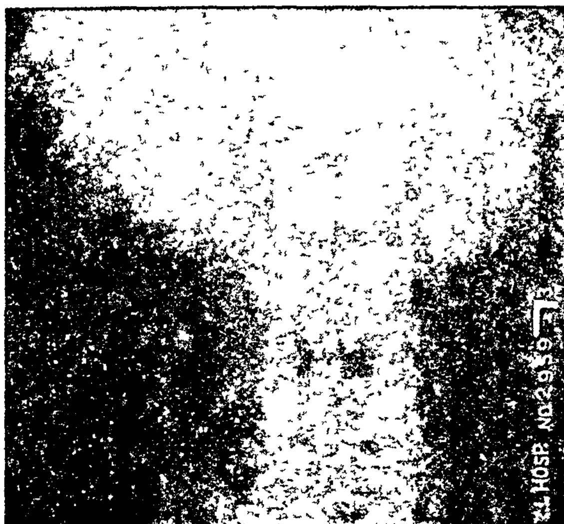
*Gastric freezing*—Peptic activity inhibited and achlorhydria achieved by circulation through stomach of iced water with alcohol as additional coolant through an indwelling gastric balloon.

**Prevention of recurrence:**

1. *Education of patient*—(a) About recurrent nature of disease. (b) Avoid—tobacco, coffee, tea, alcohol, hurried meals, raw vegetables and fruits, fried food, meat extracts, condiments and spices. (c) No emotional stress. (d) Regular hours of rest and sleep. (e) Avoid excessive fatigue. (f) Avoid drugs which might reactivate ulcers, such as aspirin, butazolidine, steroids, and rauwolfia.
2. *Dietary management*—with interval feedings. Snacks between breakfast and lunch and lunch and dinner and a glass of milk before retiring. Snacks may consist of biscuits, toast, or chapatis with or without butter, sandwiches, light



Gall stones  Opaque facet stones in the gall-bladder



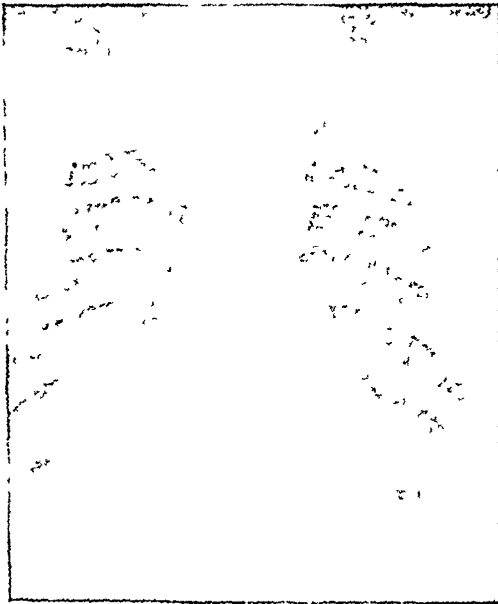
Large stone in left kidney and signet ring gall-stone  (A lateral plate is required to distinguish between a gall-bladder stone and a right sided renal calculus)



Pancreatic calcification seen to lie in line of the pancreas Multiple calcification indicates chronic pancreatitis, few calcifications may suggest stones in pancreatic duct  (For causes of abdominal calcification refer Chapter 14   19)



Small intestinal obstruction showing dilatation of the intestine and fluid levels



Chest radiograph showing free gas beneath each diaphragh Causes

1. Perforated hollow viscus
2. Post-operative
3. Peritoneal dialysis
4. Diagnostic tubal insufflation
5. Therapeutic pneumoperitoneum, or spontaneous in multiparous females on sudden squatting
6. Peritoneal infection by gas-forming organisms



Colonic strictures due to tuberculosis

cake, curds, butter milk, milk, ice cream, custard or pudding.

3. *Psychotherapy*—when indicated.
4. *Preparedness*—Intensified therapeutic regime on exposure to circumstances known to aggravate ulcer—(a) Acute respiratory infection. (b) Excessive work or severe fatigue. (c) Insomnia and nervous irritability due to emotional tension.

**Indications for surgical treatment:**

1. Pyloric stenosis.
2. Perforation, acute and chronic.
3. Recurrent bleeding.
4. Evidence of penetrating or adherent ulcer.
5. Intractability—Recurrence or persistence of distress despite most rigid medical regimen.
6. Serious persistent hour-glass deformity.
7. Very large ulcers.
8. Combined gastric and duodenal ulcers.
9. Suspicion of malignancy.
10. Economic considerations.

## 10. CARCINOMA OF THE STOMACH

**Etiology:** (a) Age—55 to 65 years. (b) Sex—More in males 3 : 1. (c) Hereditary tendency and increased incidence in those with blood group A. (d) Predisposing factors—Atrophic gastritis, gastric ulcer, gastric polypi, pernicious anaemia.

*Morphologic types*—(i) Polypoid. (ii) Ulcerating. (iii) Ulcerating and infiltrating. (iv) Infiltrating.

**Clinical features:**

MODES OF ONSET—

1. Epigastric discomfort. Fullness or burning after heavy meal or dietary indiscretion. Belching.
2. Disturbances of appetite and nausea. Diminution of appetite. Sometimes a distaste for certain heavy foods particularly meat. Recurring bouts of nausea.
3. Bouts of vomiting.
4. Post-prandial distress simulating peptic ulcer.
5. Hematemesis or melena may be first symptom.
6. Substernal oppression, slight dysphagia after solids, cough induced by swallowing and regurgitation may occur if lesion in lower oesophagus.

7. Colonic symptoms—(a) Diarrhoea due to associated achlorhydria or rapid stomach emptying. (b) Constipation and lower abdominal discomfort.
8. Discovery of a lump by the patient.
9. Loss of weight and strength.
10. Anaemia and pallor.
11. Symptoms due to metastasis—Ascites, jaundice, pathological fracture.
12. Acute abdomen—Rarely perforation of a gastric carcinoma may be the first manifestation.
13. Dyspnoea with unexplained right heart failure due to lymphangitic carcinomatosis (subacute cor pulmonale).

**Signs:**

1. Abdominal mass may be felt in epigastrium.
2. Visible peristalsis.
3. Anaemia.
4. Evidence of metastasis—Enlarged liver, lymph node metastases in neck and in pelvic floor.
5. Fever—not uncommon.

**Clinical types:**

1. *Insidious type*—Anorexia, nausea, abdominal discomfort. Later regurgitation, vomiting, loss of weight, anaemia, marked anorexia, jaundice and ascites.
2. *Obstructive type*—(a) *Pyloric type*—short history, pain, anorexia, nausea. Vomit offensive and containing altered blood. Constipation. (b) *Cardiac orifice type*—Anorexia, epigastric pain soon after food, sensation of food sticking in lower part of oesophagus. Recurring regurgitation of frothy, salivary decomposing fluid.
3 *Peptic ulcer type*—In a case of peptic ulcer, malignancy should be suspected if (a) loss of periodicity of attacks of symptoms, (b) Mild but continuous pain, (c) Marked anorexia and nausea, (d) Vomiting no longer relieves, (e) Increase in loss of weight.

**Investigations:**

1. *Blood*—Anaemia, usually macrocytic.
2. *Gastric contents*—(i) Achlorhydria or hypochlorhydria common, but presence of hydrochloric acid does not rule out carcinoma. (ii) Cytological diagnosis—Malignant cells may be found in gastric juice in about half the cases.
3. *Stool*—Occult blood may be present.
4. *Gastroscopy*—and biopsy under direct vision.

5. *Radiology*—Several different appearances may be observed —(i) Ulcerlike defect or niche. (ii) Intraluminal or subtraction defect of the outline of the opaque meal. (iii) Constricting fibrotic defect. Annular narrowing near pylorus or in fundus. (iv) Pyloric elongation, narrowing or rigidity. (v) Carcinoma near cardia producing distortion of the contour of the air bubble. (vi) Diffuse fibrosis—leather bottle stomach. (vii) Appearance of ulcer within a mass (Meniscus sign). (viii) Hyperrugosity—Extreme enlargement of gastric rugal or mucosal folds.

MANAGEMENT: Subtotal gastrectomy if growth is operable.

## 11. HEMATEMESIS (AND MELENA)

**Definition:** Rapid loss of blood from a lesion in the oesophagus, stomach or duodenum above the level of the ampulla of Vater will almost always result in vomiting of blood. Slow bleeding from upper GI tract may be manifest only as melena or tarry stool.

**Causes:**

I. *Peptic ulcer group*—
   Duodenal ulcer
   Acute gastric erosions and erosive gastritis—Gastritis, ingestion of drugs like aspirin, steroids, or phenylbutazone.
   Chronic gastric ulcer
   Hiatus hernia
   Postoperative group—previous partial gastrectomy.

II. *Carcinoma of stomach.*

III. *Portal hypertension.*

IV. *Chronic gastritis.*

V. *Other causes*—
   1. Hypertension especially malignant.
   2. Uremia.
   3. Blood dyscrasias—Hemophilia, leukemia, purpura, polycythemia rubra vera.
   4. Neurological disease—Cerebro-vascular accidents.
   5. Collagen disease—Polyarteritis nodosa.
   6. Simple or malignant tumours of alimentary tract—leiomyoma, adenoma, lymphosarcoma.
   7. Pancreatic or ampullary carcinoma.
   8. Alimentary tract diverticuli.
   9. Local vascular lesions—atherosclerosis or telangiectasis; aortic aneurysms.
   10. Anticoagulant drugs.

11. Oesophageal tear due to strain of vomiting (Mallory-Weiss syndrome).
12. Miscellaneous—Spurious due to blood swallowed after hemoptysis or epistaxis, after trauma to abdomen or following burns, erosion of duodenum by gall-stone. Hereditary telangiectasia, pseudoxanthoma elasticum, Ehlers Danlos syndrome, Peutz-Jegher's syndrome.

**Investigation of a case of upper gastro-intestinal bleeding:**

I. Cause of bleeding:

HISTORY—Chronic peptic ulcer suggested by its typical periodic pain. Recent dyspepsia, anorexia and weight loss would favour gastric carcinoma. A cirrhotic patient may give history of alcoholism, jaundice or abdominal distension. Ask for history of trauma, infection or ingestion of drugs like aspirin, phenylbutazone or steroids, and for symptoms of some general medical condition like hypertension, uremia or haemorrhagic state. Severe vomiting preceding bleeding may suggest laceration at the cardio-oesophageal junction. Possibility of hiatus hernia suggested by heartburn occurring on bending down or lying down at night, occasionally associated with acid regurgitation into mouth.

PHYSICAL EXAMINATION:

*Abdominal*—Local tenderness over ulcer. Hepato-splenomegaly with or without ascites would suggest portal hypertension.

*General*—For glands in neck, purpuric or telangiectatic lesions, for evidence of atherosclerosis or hypertension, for jaundice, spider naevi and hepatic foetor.

INVESTIGATIONS:

1. *Gastric intubation*—Ryle's tube passed gently via nose at first into lower one-third of oesophagus and gentle aspiration done. (a) *Presence of blood*—(i) If blood is obtained, most likely site is oesophagus or stomach. (ii) Absence of blood in stomach when active bleeding is suspected suggests possible source of bleeding distal to the pylorus. (b) *pH of the samples*—High night acid output suggests duodenal ulcer. Low acid outputs are compatible with acute gastric erosions. Intermediate values with low nocturnal pH are found usually with chronic gastric ulcer.

2. *Barium meal*—examination done early may demonstrate an ulcer which may not be evident after 2 to 3 weeks.

3. *Endoscopy*—should be carried out preferably within 24 hours when active bleeding has stopped and patient has been resuscitated.

4. *Splenoportography*—for diagnosis of cirrhosis.



Ulcerative colitis showing absence of haustrations and "ribbon" contour




Fragmentation and clumping of barium in the small intestine indicating malabsorption

5. *Investigation for blood dyscrasia*—Blood dyscrasias are infrequent causes of hematemesis but when the source of bleeding is not obvious nor the history typical, the possibility of an underlying haemorrhagic diathesis should be investigated.

6. *Arteriography*—helpful in detecting vascular malformations or the occasional bleeding from a very small mucosal lesion. It is not possible to do angiographic studies if barium meal has previously been attempted.

**II. Assessment of blood loss:**

CLINICAL—(i) Syncope suggests considerable blood loss. (ii) Persistent state of shock. (iii) Pulse rate above 110 per minute. (iv) Systolic B. P. 110 or below.

LABORATORY—(i) Base-line hemoglobin and packed cell volume should be obtained though the results are of no value since hemoglobin does not show any fall immediately after haemorrhage, due to peripheral vasoconstriction. (ii) Determination of blood volume—using red cells tagged with radioactive isotope provides valuable information.

**III General investigations:**

1. *Blood urea*—frequently rises after acute gastro-intestinal haemorrhage but marked elevation together with presence of albumin, casts, and white cells in urine suggests presence of coexisting renal disease.

2 *Blood ammonia*—Bleeding ulcers in presence of normal hepatic function cause only a slight rise in blood ammonia. Elevated levels may reveal unsuspected cirrhosis.

3. *Electrocardiogram and Chest radiograph*—should be taken in case surgery may have to be undertaken.

**Management of gastro-duodenal haemorrhage:**

1. *Admission to hospital*—is necessary because a small bleed may herald a life-threatening haemorrhage.
2. *Rest in bed*—Patient must be kept warm and asked to remain still. If state of shock raise foot of bed.
3. *Sedation*—Secure mental relaxation with phenobarbitone soluble 300 mg. IM. or in severe cases by 15 mg. morphia or 100 mg. pethidine. (Morphine should be avoided in patients with cirrhosis.)
4. *Observation*—Check pulse and B.P. half-hourly. Indications for continuing or recurrent haemorrhage are—falling blood pressure, rising pulse rate, patient feeling suddenly faint together with evidence of pallor, restlessness and sweating.
5. *IV saline drip*—should be set up to allow rapid access to circulation if necessary.

6. *Blood transfusion*—Indications—(a) Clinical evidence of large haemorrhage—cold extremities, restlessness, thirst, dyspnoea, faintness. (b) Hemoglobin less than 10 g./100 ml. (c) Systolic B.P. below 100 mm Hg. (d) Pulse rate over 120 or rising pulse rate. Central venous pressure readings are advisable both to determine whether adequate blood and fluid have been replaced and also to give warning that bleeding may have restarted.
7. *Diet*—(a) *Liberal feeding*—Early and almost immediate feeding is advantageous—It helps to provide calories, maintain fluid and electrolyte balance and favours ulcer healing by neutralizing acid and may avert nausea and vomiting.
   6 a.m.—cup of milk.
   8 a.m.—strained porridge 3/4 cup with milk and sugar, eggs, orange juice.
   10 a.m.—2 half-boiled or poached eggs, or cream or butter with bread or chapatis.
   12 noon—mince meat, chicken or boiled fish, mashed potato, bread or chapati, or cottage cheese. boiled potato, banana.
   2 p.m.—egg custard or cereal pudding or curd.
   4 p.m.—cup of milk, three slices of thin bread and butter, sponge cake or biscuits.
   6 p.m.—vegetable soup or minced chicken sandwich or custard or curd or bread and biscuits.
   8 p.m.—pudding or jelly, cup of milk.
   10 p.m.—cup of milk.

   Milk feeds during the night if patient is awake. Liberal fluid intake to avoid dehydration (water or dilute saline).

   (b) *Milk*—If patient cannot tolerate food, there is pain or evidence of pyloric stenosis give 4 to 6 oz. milk (flavoured) hourly. If milk is not tolerated give glucose-fortified fruit drinks.

   (c) *Starvation*—If nausea and vomiting, nothing by mouth except pieces of ice to suck or water or dilute saline for 48-72 hours or till arrest of bleeding. Then half strength normal saline 4 oz. every 4 hours for 24 hours. Oral feeds are started when nausea and vomiting have subsided and a desire for food is expressed.
8. *Care of bowels*—Patients with hematemesis tend to be constipated. Purgatives should not be given. Suppositories may be used after 48 hours.
9. *Drugs*—(a) *Antacids*—every 2 hours in powdered or gel form, or cimetidine.

(b) *Iron*—by mouth after stools have returned to normal colour.

10. *Special measures*—
    (a) *Intragastric drip*—through a small polyethylene tube. Milk and aluminium hydroxide mixtures. Useful if night pain.
    (b) *Gastric lavage*—Distension of stomach with blood clot may prevent the atonic stomach of a shocked patient from arresting the bleeding by contraction. Emptying the stomach by nasogastric suction followed by lavage with ice-cold water may help to stop bleeding.

11. *Surgery*—Indications—(a) Bleeding from chronic gastric ulcer. (b) Bleeding from chronic duodenal ulcer if long history of ulcer. (c) Renewed bleeding from chronic duodenal ulcer after initial cessation if patient is over 50. (d) Very rapid bleeding.

For special measures in control of hematemesis due to portal cirrhosis. See cirrhosis.

## 12. HEPATITIS

**Causes :**

**I. Infections—**

1. *Viral*—Infective hepatitis, serum hepatitis, yellow fever.
2. *Spirochetal*—Weil's disease, relapsing fever, syphilis.
3. *Protozoal*—Amoebic hepatitis, malaria, hydatid disease, schistosomiasis.
4. *Bacterial*—Liver abscess, cholangitis, portal bacteremia.

**II. Toxins—**

1. *Direct hepatotoxins*—Alcohol, carbon tetrachloride.
2. *Drug hepatitis*—Butazolidine, PAS, halothane, paracetamol, etc.
3. *Systemic infections*—Pneumonia, septicemia, malaria, infectious mononucleosis.
4. *Physical agents*—Burns, irradiation of liver.

### VIRAL HEPATITIS

**Definition :** The term viral hepatitis refers to infections caused by atleast two viruses—Hepatitis A causing infectious or epidemic hepatitis, and hepatitis B causing serum hepatitis or homologous serum jaundice. These two clinically and pathologically similar forms of hepatitis can be differentiated by specific laboratory tests. A third type of hepatitis unrelated to hepatitia A or B virus (non-A, non-B hepatitis) is now the

most common type of post-transfusion hepatitis occurring in some areas.

**Epidemiology:**

*Age*—Commonest in children and young adults, because acquired immunity develops with age. *Sex*—Both sexes. *Causal virus*—Not yet isolated for hepatitis A. Infection with HBV results in the appearance of atleast 3 serological markers in the serum. (a) Hepatitis B surface antigen—Australia antigen (HBsAg) and later the surface antibody. (b) An antigen (HBcAg) located in the core of the virus particle (Dane virus) which gives rise to core antibody. (c) e antigen (HBeAg) which correlates closely with the number of virus particles and the relative infectivity of serum. This is a distinct antigen specifically associated with hepatitis B.

TRANSMISSION OF VIRUS—

*Hepatitis A virus*—Mode of spread is by faecal-oral route (contamination of food or water).

*Hepatitis B virus*—Parenteral route.

(1) Transmission may result from transmission or accidental inoculation of minute amounts of blood—medical, surgical and dental procedures, IV and percutaneous drug abuse, immunisation, laboratory accidents, acupuncture, tattooing. Accidental inoculation with objects such as razors that have been contaminated with blood. Repeated biting by blood sucking arthropod vectors. (2) Intimate personal contact and by sexual route. Various body fluids such as saliva, menstrual and vaginal discharges, seminal fluid, breast milk and serous exudates have been implicated in the spread of infection. (3) Transmission from carrier mothers to their babies can occur during the perinatal period.

Non-A, non-B hepatitis—Most common type of post-transfusion hepatitis.

*Incubation period*—15-50 days for virus A hepatitis (short-incubation hepatitis), 15-180 days for virus B hepatitis (long-incubation hepatitis).

**Clinical picture:**

*Modes of onset*—(a) Insidious—Anorexia, gastro-intestinal symptoms, low grade fever. (b) Febrile—Temperature rising suddenly to 101°-103°F. Jaundice after 2 or 3 days. (c) Hepatitis without any manifest jaundice. (d) Ambulatory—Patient continues work till jaundice is noticed.

**I Preicteric phase—**

Prodromal period of 4 to 7 days.

1. Malaise.
2. Anorexia. Sometimes nausea and vomiting, diarrhoea.
3. Fever for 2 to 5 days till appearance of jaundice.
4. Abdominal distress of 3 types: (a) Mild, dull and aching in character in right upper quadrant. (b) Pylorospasm causing severe pain like biliary colic. (c) Epigastric soreness due to persistent vomiting.
5. Urine—becomes high coloured.
6. Liver—Slight to moderate enlargement with tenderness usually precedes jaundice.

**II. Icteric stage—**

1. Jaundice on 3rd or 4th day gradually deepens or rapidly increases, in average case lasts about 6 weeks.
2. High coloured urine (due to bilirubinuria).
3. Fever—none or little rise of temperature. Bradycardia may occur.
4. Loss of weight common.
5. Stools become light in colour and remain so for a number of days.
6. Percussion over right lower ribs causes discomfort.
7. Spleen palpable in 25 per cent cases.
8. Pruritus in some cases, and rarely spider naevi and palmar erythema.

**Clinical types and complications:**

1. *Relapsing or recurrent type*—Relapse may be precipitated during convalescent phase by premature activity or alcohol. Recurrence of symptoms and jaundice but milder course.
2. *Fulminating hepatitis*—Acute overwhelming infection. Warning symptoms of imminent cholemia are mental confusion, flapping tremor of outstretched hands, persistent vomiting and foetor hepaticus. Haemorrhages common. Usually fatal.
3. *Nonicteric hepatitis*—especially in children. Symptoms chiefly those of gastroenteritis. Liver may be enlarged and tender. Diagnosis confirmed by liver function tests especially enzyme levels.
4. *Subacute (chronic persistent) hepatitis*—There is absence of complete recovery from the attack and fluctuating jaundice and low fever persist. Liver is enlarged and tender and spleen is palpable. Other signs of hepatocellular failure gradually supervene.

5. *Post-hepatitis cirrhosis*—The patient passes into a state of cirrhosis following a severe, prolonged and relapsing attack of acute hepatitis.
6. *Cholestatic hepatitis*—Deep jaundice and pruritus continue for more than four weeks. Biochemical changes those of obstructive rather than parenchymatous jaundice. Liver biopsy shows bile stasis. Recovery slow but complete.
7. *Post-hepatitis syndrome*—Characterised by malaise, fatigue, dietary fat intolerance and right upper quadrant discomfort. Probably due to persistence of HBAg in liver or other organs.

**Investigations :**

1. *White cell count*—Lymphocytopenia is usual.
2. *Urine*—Bilirubinuria precedes onset of jaundice. Excess of urobilinogen early in the illness but this may disappear during cholestasis.
3. *Liver function tests*—(a) Serum bilirubin—usually below 15 mg. %, values above 30 mg. % can occur in post-transfusion hepatitis. (b) SGOT and SGPT levels raised considerably. (c) Serum alkaline phosphatase moderately elevated.
4. *Hepatitis B antigen (HB Ag) test*—is positive in many cases of hepatitis B.

**Differential Diagnosis :**

A **Pre-icteric phase—**

Influenza, gastro-enteritis, enteric fever, malaria, meningitis, acute appendicitis, alcoholic hang-over.

B **Icteric phase—**

1. VIRUS A HEPATITIS OR VIRUS B HEPATITIS :

| | *Virus A hepatitis* | *Virus B hepatitis* |
|---|---|---|
| Incubation period | About 30 days | About 100 days |
| Age | Usually children and young adults | Any age |
| Route of infection | Faecal-oral route | Blood, intimate personal contact or sexual route. |
| Usual onset | Abrupt and often febrile | Insidious, usually afebrile |
| Duration of jaundice | Shorter | Longer |
| Infection of contacts | May occur | Not so common |
| Abnormal liver function tests | Preceded by symptoms for several days | Often precede symptoms by several days |

| | *Virus A hepatitis* | *Virus B hepatitis* |
|---|---|---|
| HB Ag in blood | Less often found | More often found and patient's blood highly infectious |
| Carrier stage | No | Persistent carrier stage not uncommon |
| Prophylactic value of gamma globulin | Good | Questionable |
| Mortality | Low | High May progress to chronic active hepatitis, cirrhosis, or primary liver cancer |

2. OBSTRUCTIVE JAUNDICE—

| | *Obstructive jaundice* | *Livercell jaundice* |
|---|---|---|
| *History*: | | |
| Age | Usually middle or beyond. | Usually young individuals |
| Previous history | Attacks of pain if stone, common duct operation if stricture. Antecedent weight loss with neoplasm. | Exposure to hepatotoxic drugs or contact with other cases of jaundice |
| Rate of development of jaundice | Slow. | Rapid |
| Pain | Common. | Usually absent |
| Pruritus | Marked. | Transient. |
| *Examination*: | | |
| Spleen | Rarely enlarged. | May be enlarged. |
| Gall-bladder | May be palpable when due to neoplasm | Not palpable. |
| Liver (tender) | Rare except in acute cholecystitis. | Often present early. |
| *Laboratory tests*: | | |
| *Urine* | | |
| Bilirubin | Increased. | Normal or increased |
| Urobilinogen | Decreased. | Normal on increased |
| *Stool*: | | |
| Stercobilinogen | Decreased | Increased. |
| Occult blood | May be present if malignant obstruction | No blood |
| *Liver function tests*: | | |
| Positive tests: | High percentage of conjugated bilirubin in blood<br>Raised alkaline phosphatase | Raised conjugated and free bilirubin<br>Raised transaminases |
| Negative tests: | Transaminase γ-glutamyl transpeptidase | 5-nucleotidase<br>Alkaline phosphatase |
| *Endoscopic cholangiography* and *imaging* | May provide precise diagnosis | — |

3. HEMOLYTIC JAUNDICE—

(a) *Symptoms and signs*—(i) Anaemia—may vary from time to time developing rapidly with hemolytic crisis. (ii) Jaundice usually mild and of a lemon yellow tint. No pruritus. (iii) Pigmented gall-stones may be associated with features of chronic cholecystitis. (iv) Splenomegaly in chronic forms. (v) Ulcers or pigmentation from healed ulcers usually over the malleoli in some cases. (b) *Hematology*—Anaemia variable, anisocytosis, stippling, target cells. Reticulocytes increased. Leucocytosis common. (c) *Stools*—Dark in colour due to increased stercobilinogen. (d) *Urine*—Urobilinogen increased only during crisis. Hemoglobinuria if rapid blood destruction. (e) *Serum biochemistry*—Serum unconjugated bilirubin raised (usually 1-3 mg./100 ml. serum). Serum conjugated bilirubin slightly raised.

4. PORTAL CIRRHOSIS—(a) Jaundice usually slight and transient. (b) Liver enlarged, may be tender. (c) Long history of dyspeptic symptoms. (d) Hematemesis common.
5. AMOEBIC HEPATITIS—(a) History of amoebic dysentery may be obtained. (b) Liver enlarged and tender. Compression tenderness. (c) Jaundice slight. (d) Remittent fever. (e) Excessive sweating. (f) Rapid response to emetine or metronidazole.
6. ACUTE ALCOHOLIC HEPATITIS—History of heavy consumption of alcohol. Anorexia, weight loss, weakness and right upper abdominal pain. Jaundice. Liver enlarged and tender. Spleen may be palpable. Fever and mild anaemia.
7. DRUG-INDUCED JAUNDICE—
   (a) *Unconjugated hyperbilirubinemia*—(i) *Hemolysis* (in patients with G6PD deficiency)—methyldopa, phenacetin, primaquine. (ii) *Competition for binding sites*—sulphonamides, salicylates. (iii) *Inhibition of uptake*—cholecystographic drug Bunamiodyl. (iv) *Inhibition of conjugation*—Albamycin.
   (b) *Conjugated hyperbilirubinemia*—more common. (i) *Interference with excretion*—Rifampicin. (ii) *Effects of steroids*—methyltestosterone, norethandrolone. Oral contraceptives.
   (c) *Hepatotoxicity*—Hepatic necrosis due to carbon tetrachloride, trichlorethylene, paracetamol or ferrous sulphate overdosage; cytotoxic drugs like methotrexate, cyclophosphamide, 6-mercaptopurine.
   (d) *Hypersensitivity reactions*—(i) *Hepatitis-like reactions*—Hydrazines, iproniazid, phenelzine, methyldopa, oxy-

phenisatin, and anaesthetics like halothane. (ii) *Cholestasis with associated hepatitis*—Phenothiazines—e.g. chlorpromazine, other psychotropic drugs e.g. chlordiazepoxide, amitryptiline. Antirheumatic drugs e.g. phenylbutazone, oxyphenbutazone, indomethacin. Antitubercular drugs—PAS, rifampicin; rarely cycloserine, ethionamide, pyrazinamide and isoniazid. Other drugs—sulphonamides, co-trimoxazole, erythromycin estolate, nitrofurantoin, tolbutamide, chlorpropamide, phenindione.

8 CHRONIC ACTIVE HEPATITIS—(a) Symptoms range from none to incapacitating exhaustion. (b) Liver function tests show variable rises in serum bilirubin, transaminases and gamma globulin. (c) Liver histology shows picture of chronic active hepatitis—piecemeal necrosis, mononuclear cells and intralobular fibrosis.

9. INFECTIOUS MONONUCLEOSIS—(a) Jaundice between 5 to 14 days after onset of illness. Mild and transient. (b) Liver seldom palpable. (c) Pyrexia persisting inspite of subsidence of jaundice (d) Late glandular enlargement. (e) Typical blood changes. (f) Positive Paul-Bunnell test.

10. WEIL'S DISEASE—Abrupt onset with prostration, high fever Abdominal pain, nausea, vomiting. Severe muscular pains, headache and mental confusion Characteristic suffusion of eyes Hemorrhagic tendency. Bronchitis common. Jaundice appears between 4th and 7th day Leucocytosis Inoculation of blood into guinea pig shows spirochetes

11. YELLOW FEVER—(a) Sudden onset, high fever with marked prostration (b) Injected conjunctivae (ferrety eyes). (c) Gradually increasing albuminuria. (d) Faget's sign—marked slowing of pulse rate compared to temperature (e) Jaundice on 4th day. (f) Hemorrhages

**Management:**

1. *Rest in bed*—It is conventional to advise bed rest until clinical and laboratory evidence of acute illness have disappeared However if patient feels well enough during the illness he may remain out of bed.
2. *Diet*—High carbohydrate, high protein, low fat diet because such a diet is most palatable to the anorexic patient About 60-80 gms. of protein daily—skimmed milk, chicken or fish, egg white, curds. Plenty of carbohydrates in form of sweetened fruit juice, sugarcane juice, honey and sweet syrups. No alcohol for 6 months.
3. *Medicaments*—
   (a) *Vitamins*—Vitamin B complex and Vitamin K especially if anorexia is marked.

(b) *Parenteral feeding*—If severe nausea and vomiting 10% glucose by slow IV drip, 2000-2500 ml. in 24 hours, with added Vitamin C 500 mg.
(c) *Antibiotics*—Neomycin or Paromomycin if patient is going into severe hepatocellular failure with coma
(d) *Corticosteroids*—produce rapid fall in serum bilirubin. Usual course of 25 days of Prednisolone in doses of 30, 20, 15, 10 and 5 mg., each dose being given for 5 days. Indications—(a) Patients with prolonged cholestasis or with prolonged deep jaundice. (b) Patient with relapse or passing into subacute stage with persistent jaundice, high serum globulin and transaminase values. (c) Fulminant case.
(e) *Sedatives*—if restlessness phenobarbital or diazepam.
(f) *Antipruritics*—Calamine lotion with 1% phenol. Cholestyramine, 4 gm. t.d.s. may reduce pruritus in patients with cholestatic jaundice.

**Control:**

*Hepatitis A*—(a) Proper disposal of urine and stools of patients. (b) Boiling of drinking water for 10 minutes. (c) Passive immunisation—Normal human immuno-globulin of value in preventing disease in contacts. Dose—250 mg. IM for young children, 500 mg. for those over age of 10. Effective if given within 2 weeks after exposure.

*Hepatitis B*—(a) Blood or plasma should not be given unless absolutely necessary. (b) Blood donors with history of jaundice should be rejected. Donors should be screened for hepatitis B antigen and antibodies and positive reactors should not be accepted (c) Use of disposable syringes, or syringes boiled in water for half hour or autoclaved at 180°C for one hour. (d) Precautions in laboratories—Use of 'no touch' equipment, protective clothing, and disposable equipment. (e) Precautions for renal dialysis units—Screening of patients and staff for hepatitis B antigen, use of protective gloves and clothing, disposable elements in kidney machines and avoidance of blood for priming machines and transfusions whenever possible. (f) Contaminated articles should be heat sterilised or incinerated. Liquid disinfectants are not reliable. (g) Passive immunisation—Major indication for administering hepatitis B immunoglobulin is a single exposure to hepatitis B virus, such as occurs when blood containing the surface antigen is inoculated, ingested or splashed on to mucous membranes and conunctiva. It should not be given later than 7 days after exposure. Two doses (0.04 ml-0.07 ml/kg of 16% solution) should be given 30 days apart.

## CHRONIC HEPATITIS

**Definition**—It is a syndrome of chronic inflammatory liver disease continuing without interruption for atleast 6 months. Two types—persistent and active—are recognised based on histological appearances of the liver. Chronic persistent hepatitis is a benign condition whereas chronic active hepatitis is more serious and often progresses to cirrhosis.

### Chronic persistent hepatitis

**Etiology and pathogenesis**—In most patients association with: (a) Viral hepatitis B. Viral hepatitis non-A, non-B may sometimes be responsible. (b) Chronic drug reaction to drugs like paracctamol, oxyphenisatin, methyldopa, isoniazid, cytotoxic drugs used for long-term treatment of leukemias or in renal transplant patients. (c) Alcoholic liver disease may progress to chronic hepatitis. (d) Complicating long-standing inflammatory bowel disease such as ulcerative colitis, amoebic colitis or Crohn's disease.

**Clinical Features:**

*Symptoms*: (a) Following an attack of acute hepatitis patient may complain of continuing fatigue, fat and alcohol intolerance, and pain over liver area. (b) Patient may be asymptomatic and diagnosed when a positive hepatitis B antigen is found at time of blood donation, or detection of raised serum transaminase levels during routine blood examination.

*Signs*: The liver may be slightly enlarged and tender.

*Biochemical tests*: Show raised serum transaminase levels. Serum gamma globulin concentration is normal.

*Needle liver biopsy*: Slight inflammation confined to portal tracts.

**Treatment:** Reassurance. Avoidance of alcohol and hepatotoxic drugs.

### Chronic active hepatitis

**Etiology:** (a) Virus hepatitis B. (b) Viral hepatitis non-A, non-B, (c) Lupoid. (d) Alcohol. (e) Drugs such as oxyphenisatin, methyldopa, isoniazid, cytotoxic agents. (f) Wilson's disease. (g) Alpha-1-antitrypsin deficiency. (h) Unknown.

**Clinical Features:** 2 main types:

1. *Lupoid*—So-called because about 15% patients show LE cells in blood. Predominance in females. Amenorrhoea is usual. Serum HBsAg absent. Good response to corticosteroids.

2. *Type B*—Predominance in males. Serum HBsAg present. Risk of primary liver cancer is high and response to corticosteroids poor.

**Treatment:** 1. Avoidance of alcohol and aspirin. 2. Immunosuppression with corticosteroids with or without azathioprine useful.

## 13. LIVER FAILURE

**Definition**—This is a syndrome with neurological and psychiatric manifestations which can complicate liver disease of almost all types, and occurs as a result of hepatocellular failure.

**Etiology:**

1. *Chronic liver disease*—Cirrhosis. At times severe chronic active hepatitis, alcoholic hepatitis, extensive replacement with malignant tumours.

2. *Fulminant hepatic failure*—(a) Viral hepatitis. (b) Drugs and toxins—Overdosage with paracetamol, halothane anaesthesia, hypersensitivity to drugs such as isoniazid, methyldopa or tetracycline. Carbon tetrachloride, phosphorus or mushroom poisoning. (c) Fatty liver of pregnancy.

**Precipitating factors in cirrhosis:**

(1) *Gastro-intestinal haemorrhage*—because this is equivalent to a large protein meal and the hypotension and anaemia impair hepato-cellular function.

(2) *Acute alcoholism*—by depressing cerebral function and the associated hepato-cellular lesions.

(3) *Infections*—such as pneumonia by increasing the metabolic demands on the diseased liver.

(4) *Sedatives*—such as morphine and barbiturates because of increased sensitivity of cirrhotic patients to these drugs and prolonged action from delayed hepatic destruction.

(5) *Diuretics*—if used injudiciously by producing hypokalemia.

(6) *Paracentesis abdominis*—Mechanism not clear. Electrolyte imbalance following draining of large quantities of sodium, potassium and water, changing hepatic circulation due to reduction in portal vein pressure and hypotension due to vaso-vagal reaction may be responsible.

(7) *Constipation*—by allowing increased amounts of by-products of colonic bacterial action to be absorbed.

(8) *Diarrhoea and vomiting*—from electrolyte imbalance.

(9) *Surgical procedures*—Hepatic function is depressed by blood loss, anaesthesia and at times shock.

PATHOGENESIS—is probably multifactorial but retention of toxic metabolites is likely to be important—ammonia, mercaptan, phenol and fatty acids and other unidentified metabolites. The amines octopamine and phenylethanolamine which are weak neurotransmitters also play a role by displacing the normal neurotransmitters dopamine and noradrenaline interfere with cerebral function. Changes in the plasma ratio of aromatic to branch chain aminoacids may also be significant.

**Clinical syndromes:**

1. *Jaundice*—is invariable but may in FHF be occasionally preceded by coma in very acute case. Factors responsible are haemolysis, decreased bilirubin excretion and impaired hepatic conjugation.
2. *Bleeding tendency*—usually from upper GI tract. In cirrhosis bleeding occurs from varices or from gastric or duodenal erosions. In FHF gastric and duodenal erosions are the usual cause. Coagulation and platelet factors contribute to the bleeding diathesis.
3. *Ascites*—may develop acutely in cirrhotic patients particularly after GI haemorrhage or alcohol consumption but usually clears up if the precipitating factor is removed. Fluid retention is common in FHF.
4. *Renal failure and electrolyte disturbances*—are common.
5. *Hepatic encephalopathy*—stages:
   (a) *Prodromal*—In early stages irritability, lack of concentration, confusion and impaired memory.
   (b) *Impending coma*—Clear-cut mental confusion. Speech often slurred. Patient sleeps most of the time but can be aroused. Flapping tremor of the outstretched hands (seldom in FHF) and characteristic sweet smell of foetor hepaticus in the breath.
   (c) *Coma*—Pupils dilated. Plantars extensor. Respirations become rapid and deep. Terminal hyperpyrexia or broncho-pneumonia.
6. *Diabetes*—Glucose intolerance common in cirrhosis.
7. *Hypoglycemia*—is common in FHF.

**Management:**

1. CORRECTION OF ANY PRECIPITATING FACTORS—e.g. Haemorrhage, infection, alcoholism, barbiturate overdosage.
2. REDUCTION OF NITROGEN CONTAINING MATERIALS IN THE BOWELS—
   (a) *Dietary protein restriction*—Protein-free diet initially. 500 calories daily as glucose or lactose drinks orally,

or in unconscious patients 20% glucose by intravenous drip through catheter passed from the antecubital vein into superior vena cava, since infusions of concentrated dextrose are thrombotic when given into smaller vessels. When patient's condition improves proteins can be started gradually.

(b) *Bowel wash*—Enemata or colonic wash to empty bowel of nitrogenous material.

(c) *Gut sterilisation*—Neomycin 1 gm. 6-hourly by mouth daily.

(d) *Colonic bacterial replacement*—Administration by mouth of freeze-dried cultures of Lactobacillus acidophilus may be of value in addition to Neomycin in patients failing to respond satisfactorily. It is given in doses of 20-40 gm. daily.

(e) *Lactulose*—The disaccharide lactulose is broken down in the colon by bacterial action to lactic and other acids. Faecal pH is thus lowered and the growth of lactobacilli is stimulated while that of other bacteria is decreased. Dose 4 to 12 ml. of the syrup t.d.s. It can be continued long-term in the patient with chronic hepatic encephalopathy. Lactulose can also be given as enema (200 ml. made up to one litre with water).

(f) *Surgery*—Colonic exclusion by ileo-rectal anastomosis may be used in selected cases who have neuropsychiatric changes resistant to all other measures.

3. Measures to improve hepato-cellular function—

(a) *Maintenance of fluid and electrolyte balance*—Fluid balance charts are essential and plasma sodium, potassium, chloride, bicarbonate and urea levels should be checked regularly.

(b) *General care*—as that of an unconscious patient. If restlessness, phenobarbitone 100 mg. or diazepam 10 mg. IM.

(c) *Vitamins*—B complex and vitamin K.

(d) *Glucose*—IV should be given in large amounts (2.5 kg/ 24 hours) if severe hypoglycemia. Blood sugar should be estimated every 4 hours.

(e) *Control of infection*—with antibiotics.

4. Control of haemorrhage—(a) For bleeding in cirrhosis—see cirrhosis. (b) *For* FHF—Cimetidine IV. Infusion of clotting factor concentrates or platelets seldom necessary.

5. Treatment of water overload and renal failure—by haemodialysis.

6. OTHER THERAPEUTIC MEASURES—
   (a) *Corticosteroids*—Hydrocortisone 100 mg. every 6 hours. May be useful in those with active liver cell necrosis, and improve patient's general condition and allow more time for cellular regeneration.
   (b) *Levodopa*—to increase CNS dopamine. Dose of 250 mg. qds. through Ryle's tube. The effect is transient *Bromocriptine* may be tried if patient does not respond to conventional therapy.
   (c) *Hyperimmune serum*—Containing antibody to HB Ag antigen if due to HB Ag antigen positive hepatitis.
   (d) *Exchange transfusion*—Beneficial effects due to removal of toxic substances or introduction of coagulation factors and unknown materials that may promote recovery.
7. TEMPORARY LIVER SUPPORT—
   (a) *Extracorporeal liver perfusion*—Connection of the patient to isolated but functioning animal liver in an extracorporeal perfusion circuit.
   (b) *Cross-circulation*—with volunteers who have compatible blood provided hepatic coma is not caused by infective agent or malignant disease. Cross-circulation with patient dying of irreversible brain lesion or with baboons.
8. LIVER TRANSPLANT.

## 14. JAUNDICE

**Definition**—It is a symptom complex characterised by increase of bile pigments in body fluids and tissues. Jaundice is perceptible only when the level of bilirubin and its conjugates exceed 1.5 mg. per 100 ml. plasma.

**Normal bile pigment metabolism**—(Fig. 11).

1. *Breakdown phase*—Hemoglobin breakdown occurs in the reticulo-endothelial system forming the bile pigment bilirubin which is transported in the blood stream attached to albumin.
2. *Conjugation phase*—Unconjugated bilirubin is lipid soluble and cannot be excreted by the kidney. For elimination it is transported to the liver, taken up into the hepatocytes and chemically altered (conjugated). Transport to the liver occurs by loose binding with serum albumin; uptake into the liver involves linking with specific binding proteins Y and Z found in liver cell cytoplasm. Conjugation is a function of microsomes of the smooth endoplasmic reticulum of the hepatocytes.

However these levels may be exceeded when there is also increased bilirubin production from excess hemolysis as in sickle cell disease. Presence of conjugated bilirubin as the predominant pigment in blood can produce—

(a) *Hepatic jaundice*—(i) Due to impaired canalicular secretion of bilirubin—Dubin-Johnson and Roter syndromes. (ii) Canalicular disease (cholestasis)—Alcoholic hepatitis, oestrogens, viral or drug hepatitis, cholestasis of pregnancy, macronodular cirrhosis, Hodgkin's disease. (iii) Disease of small intrahepatic ducts—(cholestasis)—Primary biliary cirrhosis, intrahepatic biliary stasis.

(b) *Post-hepatic (surgical) jaundice*—due to extrahepatic mechanical obstruction—(a) Inside duct—gall stones, foreign body (broken T-tube), parasites (ascaris, hydatid). (b) In duct wall—congenital atresia, stricture, tumour of bile duct, sclerosing cholangitis. (c) Outside duct—carcinoma of head of pancreas or of ampulla of Vater, pancreatitis, metastases in porta hepatis, chronic duodenal ulcer.

## INVESTIGATION OF A CASE OF JAUNDICE

### I. History:

**(a) Personal history:**

1. *Age—New born*—physiological jaundice, familial icterus gravis, infective jaundice, congenital syphilis, congenital obliteration of bile ducts. *Children and young adults*—usually infective hepatitis. *Middle and old*—gall stones, carcinoma. Gall stones and drug hepatitis can occur at any age.
2. *Sex*—Carcinoma pancreas, portal cirrhosis and hepatoma more common in men; common duct stone, primary biliary cirrhosis and carcinoma gall-bladder more common in females.
3. *Occupation*—Weil's disease in fish-handlers, sewer workers, etc. Toxic hepatitis from trinitrotoluene in ammunition workers.

**(b) Family history:**

Congenital hyperbilirubinemia, hemolytic jaundice and gall stones often have more than one member of the family suffering from the disease.

**(c) Past history:**

1. *Administration of hepatotoxic drugs or blood products*—e.g., chlorpromazine, carbon tetrachloride, oral contracep-

tives, methyl testosterone, sulphonamides. Blood transfusion or convalescent serum. Treatment in renal dialysis unit. Repeated halothane anaesthesia.

2. *Heavy alcoholic consumption*—may point to alcoholic hepatitis or cirrhosis.
3. *Cholecystectomy*—may suggest residual stone in common bile duct or traumatic stricture.
4. *Tattooing*—if recently done.

(d) **Symptoms:**

1. *Jaundice*—(i) *Duration:* Less than one month: hepatitis, 1–2 months: carcinoma or chronic active hepatitis, more than 2 months: chronic liver disease. (ii) *Progression:* Progressive jaundice suggests malignant obstruction. Fluctuating jaundice likely with stone in common bile duct, carcinoma of ampulla of Vater, or recurrent hemolytic episodes.
2. *Digestive distress*—Anorexia, nausea and epigastric discomfort for few days in infective hepatitis, may occur in neoplastic jaundice and cirrhosis. Long history of dyspepsia with bloating after meals and intolerance to fatty food suggestive of chronic cholecystitis.
3. *Weight loss*—in malignancy and cirrhosis.
4. *Abdominal pain*—Colicky pain in common duct stone and extrahepatic biliary obstruction. Epigastric pain radiating through to the back and associated with obstructive jaundice may be seen with acute pancreatitis, posterior penetrating duodenal ulcer or carcinoma of pancreas.
5. *Fever*—Suggestive of virus hepatitis, cirrhosis, or metastatic disease. Associated chills or rigors likely in acute cholecystitis, cholangitis, amoebic hepatitis, liver abscess.
6. *Diarrhoea*—Mild to moderate may occur in cirrhosis. Steatorrhoea suggests likelihood of obstruction to flow of bile. History of mucus and blood in stools may suggest amoebiasis.
7. *Pruritus*—Intense in obstructive jaundice. Pruritus in extreme form suggests intrahepatic cholestasis.
8. *Feeling of illness*—in hepato-cellular jaundice but not in obstructive jaundice.
9. *Backache*—in pancreatic disease.
10. *Colour of stool*—In infective hepatitis the stools are usually clay-coloured for a few days. In common duct stones stools may be alternately acholic and cholic; in neoplasm stools remain acholic, once normal colour is lost. The occurrence of brown stools in the presence of deep jaundice

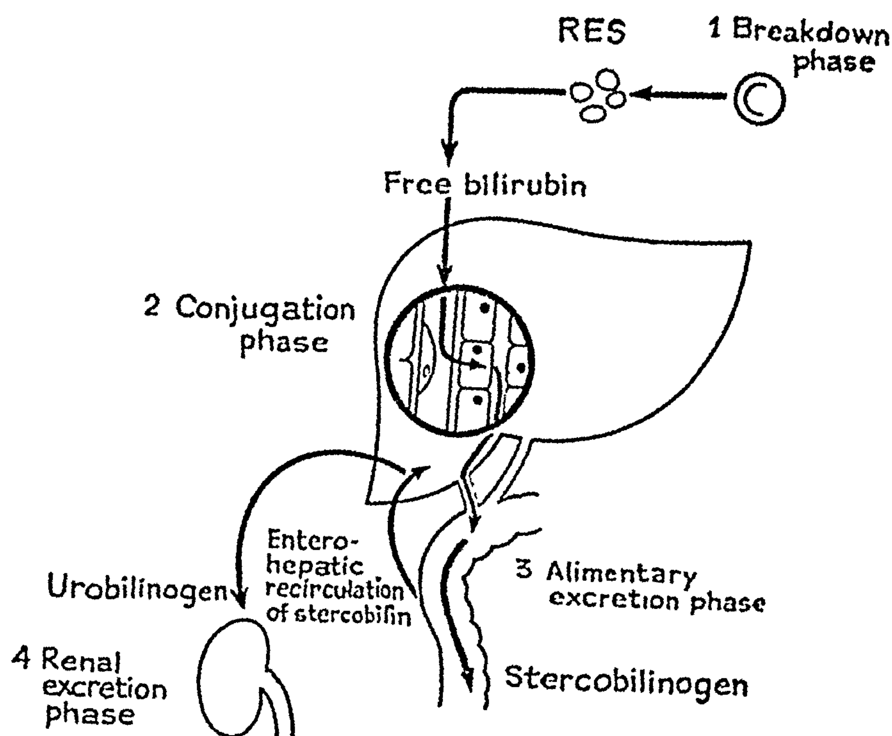



Fig. 1.1 Normal bile pigment metabolism

3 *Alimentary excretion phase*—The bilirubin is excreted through the bile canaliculi and so reaches the intestines, where it is converted into stercobilinogen, probably by the bacteria. A large part is reabsorbed from the intestines into portal blood and carried back to the liver and re-excreted into the bile (enterohepatic circulation of bile pigments). Stercobilinogen which is not absorbed gives the faeces its brown colour.

4. *Renal excretion phase*—A small part of stercobilinogen (4 mg. daily) passes into the general blood stream and is carried to the kidney for excretion in the urine as urobilinogen.

**Mechanism of jaundice production**—Increase of bilirubin in blood may arise in 4 different ways :

1. *Increased bilirubin load on liver cells*—e.g., hemolytic states.

2. *Disturbance of transport*—Disturbance in process by which bilirubin diffuses into the cells from the sinusoids and is actively transported to the microsomes for conjugation

(intracellular bilirubin transport)—e.g., familial non-hemolytic jaundice, virus hepatitis.

3. *Disturbance of bilirubin conjugation*—e.g, physiological neo-natal jaundice due to deficiency of enzymes which conjugate bilirubin.
4. *Disturbance of excretion*—(a) Intrahepatic cholestasis—Difficulty in canalicular transport of bile from microsomes to main bile ducts, e.g., chlorpromazine jaundice. (b) Extra-hepatic cholestasis—obstruction of main bile ducts, e.g., due to carcinoma of head of pancreas.

**Classification:**

**I. Clinical**—3 types but combinations can occur:

1. *Hemolytic.*
2. *Liver cell* (hepatic).
3. *Obstructive*—(a) Intrahepatic. (b) Extrahepatic (Surgical jaundice).

**II. Biochemical**—The importance of the microsome has led to division of common clinical forms of jaundice into—(1) *Premicrosomal* (hemolytic), and (2) *Postmicrosomal* (liver cell, or obstructive). Certain other forms of jaundice resulting from genetic and acquired abnormalities of haemoglobin metabolism also lend themselves to this biochemical method of classification.

**1. Unconjugated hyperbilirubinemia—**

Unconjugated bilirubin—is lipid soluble and can cross the bowel wall from blood. Bilirubin does not cross the renal glomerulus and jaundice is therefore acholuric. Presence of unconjugated bilirubin as the predominant pigment in blood can produce—

(a) *Prehepatic jaundice*—due to increased bilirubin production: (i) Hemolysis, e g., spherocytosis, sickle cell disease, thalassemia major, G6PD deficiency. (ii) Ineffective erythropoiesis, e.g., thalassemia minor, shunt-hyperbilirubinemia due to excess bone marrow activity with peripheral reticulocytosis and hyperbilirubinemia.

(b) *Hepatic jaundice*—due to impaired hepatic uptake or conjugation of bilirubin—Gilbert's syndrome, Crigler-Najjar syndrome, neonatal jaundice, some drugs, portacaval anastomosis.

**2 Conjugated hyperbilirubinemia—**

Conjugated bilirubin—is water soluble and cannot cross the bowel wall but is excreted in urine and makes it dark. This usually prevents plasma levels rising above 20-30 mg./100 ml.

usually indicates parenchymal jaundice. Passage of tarry stools by an icteric patient should suggest carcinoma of the ampulla of Vater or cancer of pancreas invading stomach or duodenum.

11. *Colour of urine*—Dark urine indicates cholestasis or hepatocellular jaundice.

## II. Physical Examination:

A **General**—

1. *Skin changes*—(a) Depth of icterus—Orange-yellow in liver cell jaundice, pale-yellow tint in hemolytic jaundice, greenish yellow in neoplastic disease. If deep icterus and hemolysis coexist, it means that some other cause of jaundice is also operating. (b) Vascular spiders—hepatocellular jaundice. (c) Melanosis or xanthomata in prolonged biliary obstruction. (d) Scratch marks—biliary obstruction. (e) Purpura—possibly cirrhosis. (f) Sexual hair—absent in cirrhosis. (g) Pigmented shins—congenital spherocytosis. (h) Tumour deposits—cancer.
2. *Anaemia*—suggests hemolysis, cirrhosis or malignancy.
3. *Mental state*—Personality changes and slight mental deterioration may suggest hepatocellular jaundice.
4. *Hands*—Palmar erythema in cirrhosis. Clubbing of fingers in portal or biliary cirrhosis.
5. *Breath*—Peculiar sweetish slightly faecal odour in cirrhosis.
6. *Spider angiomata*—usually indicative of cirrhosis.

B. **Local (Abdominal)**—

1. *Periumbilical veins*—cirrhosis.
2. *Palpable liver*—(a) *Size*—(i) Massive—Malignant deposits, obstructive jaundice. (ii) Moderate—Hepatitis, cirrhosis, fatty infiltration. (b) *Tenderness*—Hepatitis including amoebic hepatitis, congestive failure, alcoholism, rarely malignancy. (c) *Nodularity*—Cirrhosis, malignancy or hepatic syphilis.
3. *Palpable gall-bladder*—Palpation of smooth, non-tender, gall-bladder in a patient with obstructive jaundice is important evidence that jaundice is due to neoplastic obstruction of common bile duct and not due to calculus. (Courvoisier's law). Murphy's sign—Tenderness and catching of the breath on inspiration in acute cholecystitis.
4. *Palpable spleen*—In absence of hemolytic jaundice means chronic or acute hepatitis, cirrhosis, or secondary to protracted obstruction of common bile duct by stone or tumour.

5. *Ascites*—With jaundice may be due to cirrhosis, peritoneal tumour implants or portal obstruction due to tumour.
6. *Lymphadenopathy*—Posterior cervical enlargement at times in infective hepatitis. Jaundice may occur in glandular fever. Leukemia and Hodgkin's disease may cause jaundice without any previous manifestations.
7. *Scars*—may indicate previous surgery on biliary tree.
8. *Xanthomata*—suggest chronic biliary obstruction or biliary cirrhosis.

**III. Investigations:**

1. BIOCHEMICAL TESTS :
   (a) *White cell count*—Leucopenia in hepato-cellular jaundice. Leucocytosis in cholangitis, gall stones and carcinomatosis. Eosinophilia in drug hepatitis. Atypical white cells in infectious mononucleosis.
   (b) *Urine*—(i) *Urobilinogen*—Absent in obstruction to common bile duct, excess in hemolytic jaundice, liver cell disease or combination of both. (ii) *Bilirubin*—Absent in hemolytic jaundice, excess in obstructive jaundice.
   (c) *Faeces*—Absence of bile if biliary obstruction, excess in hemolytic jaundice. Positive occult blood test suggests ampullary carcinoma, bleeding oesophageal varices, or alimentary carcinoma.
   (d) *Liver function tests*—
      (i) *Hemolytic jaundice*—Unconjugated hyperbilirubinemia. No bilirubin appears in urine (acholuric jaundice). Other liver function tests are usually normal.
      (ii) *Liver cell jaundice*—Transaminase levels very high (around 1000 IU/litre). Serum proteins—Albumin reduced in patients with prolonged liver cell disease. Raised beta-and gamma-globulins.
      (iii) *Cholestasis*—Increase in conjugated bilirubin, alkaline phosphatase (usually above 30 KA units/100 ml) and serum 5-nucleotidase. Serum proteins—raised $alpha_2$ and betaglobulin, but albumin level preserved. Transaminases only moderately raised (usually below 300 units/ml). Lipoprotein-X, an abnormal lipoprotein appears in cholestatic jaundice.

(e) *Additional blood tests*—(i) *Tests for investigation of hemolytic jaundice*—Haemoglobin and absolute values, reticulocyte count, blood film for spherocytosis and immature cells, erythrocyte fragility, Coomb's test, bone marrow examination, and if necessary transfused red cells survival studies. (ii) *In unusual cases of hepatitis*—Paul-Bunnel test for infectious mononucleosis, toxoplasma dye test, or cytomegalic complement fixation test.

(f) *Immunological tests*—Antimitochondrial antibody in primary biliary cirrhosis. Its presence excludes extrahepatic causes for cholestasis. High titres of antinuclear and smooth muscle antibodies suggest chronic active hepatitis.

(g) *Prothrombin time*—If parenteral administration of Vitamin K (10 mg.) for 3 days brings about prompt improvement of prothrombin time, this is evidence in favour of obstructive rather than hepato-cellular jaundice.

2 Radiography :

(a) *Chest x-ray*—may reveal metastasis.

(b) *Plain x-ray of abdomen*—May reveal presence of gallstones, size of liver and spleen can be correctly assessed on a correctly exposed abdominal film.

(c) *Barium swallow*—Oesophageal varices in cirrhosis.

(d) *Barium meal*—Widening of 'C' loop of duodenum or displacement of duodenum by pancreatic tumour (inverted 3 sign).

(e) *Cholecystography*—(i) *Oral*—To demonstrate enlarged gallbladder or stone in common bile duct. Not useful if serum bilirubin more than 12 mg./100 ml. (30 mmol/1). (ii) *IV cholecystography*—mainly used to visualise bile ducts when oral cholecystography has failed. Not useful if serum bilirubin is 4 mg./100 ml. (60 mmol/1) or more.

(f) *Abdominal scanning*—3 methods are used : (i) CAT (CT) scanning. (ii) Isotope scanning. (iii) Grayscale ultrasound scanning. Ultrasonology is the method of choice for initial evaluation of patients with cholestatic jaundice. It is quick and non-invasive. Interpretation—(a) *Obstructive jaundice*—(i) Ultrasound—Gall stones can easily be detected in the gall bladder. (ii) Isotope—helps to distinguish between medical and surgical jaundice. After IV injection of the isotope

(I–131 or technetium-labelled Rose Bengal), prompt appearance of activity within biliary tract indicates that the biliary tract is patent. Persistent activity within the gall bladder and delayed entry into the gut suggests common duct obstruction. (iii) CT scan—Accuracy in diagnosing extrahepatic biliary obstruction same as ultrasound, and possibly superior in diagnosing causative lesion. (b) *Hepatocellular jaundice*—(i) Ultrasound—hyper-reflexia is a feature of cirrhosis and fatty liver. The portal vein can also be visualised. (ii) Isotope scanning—Diffuse hepatocellular disease causes patchy uptake of technetium sulphur colloid. (iii) CT scan—Fatty infiltration is suggested by general appearance of low absorption in the liver, and cirrhosis and portal hypertension by a combination of a small dense liver, enlarged spleen and dilated portal vein. (c) *Pancreatic disease*—(i) CT scan—Pancreatic carcinoma can be diagnosed from alteration in size, shape, margins or density of the pancreas. Secondary deposits in liver, or ascites may also be identified. *(ii) Ultrasound can also demonstrate enlarge*ments and changes of texture of pancreas. (d) *Budd Chiari syndrome*—Isotope scanning gives a characteristic appearance.

(g) *Endoscopic retrograde cholangiopancreatography (ERCP)*—A flexible side-viewing cannulating duodenoscope is used to see the papilla of Vater endoscopically and to guide a fine polythene catheter into the pancreatic and common bile ducts. After injection of contrast medium, the pancreatic and biliary duct systems can be viewed under X-ray screening control Uses—(a) The papilla of Vater is examined, and biopsy and cytology specimens are taken if there is any suspicion of papillary disease. (b) Pancreatic cancer is shown by obstruction of main pancreatic duct, constriction or irregular pooling of contrast medium and associated extrinsic compression of bile duct. (c) It is the tech*nique of choice when gallstones are suspected in a* jaundiced patient, because the obstructing stones can be removed immediately by sphincterotomy. (d) It is useful for investigating patients with intermittent symptoms following biliary tract surgery. (e) When

retrograde cholangiography is normal, ERCP may provide an alternate diagnosis of gastric, duodenal or pancreatic disease.

(h) *Percutaneous transhepatic cholangiography* (*PCT*)—is simpler than ERCP and is highly successful when bile ducts are dilated. It helps to distinguish between obstructive and nonobstructive jaundice before surgery. In patients with obstruction to main bile ducts, there is dilatation of bile ducts within the liver. Contrast material can be injected percutaneously into these channels with a fine needle (skinny needle), and a cholangiogram obtained. If a dilated duct is not aspirated in a jaundiced patient, then the cholestasis is of infra-hepatic origin.

(i) *Transplenic portal venography*—To demonstrate portal hypertension in a suspected case.

(j) *Selective arteriography*—of coeliac axis and superior mesenteric may help in determining presence or absence of pancreatic tumours and liver metastases. Abnormal features may include invasion of vessels, presence of tumour vessels, and vascular displacement.

3. LIVER BIOPSY—Characteristic histological changes in acute hepatitis, cirrhosis or changes due to obstruction of common bile duct by stone or tumour, or malignancy of the liver, or drug-induced jaundice. Should not be performed if prothrombin time is prolonged more than 3 seconds.

4. ENDOSCOPY—
   (a) *Gastroscopy*—for presence of varices.
   (b) *Duodenoscopy*—and cannulation and visualisation of bile ducts can give good pictures of the biliary tree.
   (c) *Laparoscopy*—May help by revealing tumour nodules in the liver, a huge gall bladder with dark green liver due to extra-hepatic biliary obstruction, hob-nail liver in cirrhosis and a pale yellow-green liver suggestive of hepatitis.

5. CASONI'S TEST—If suspected hydatid disease. Intradermal injection of 0.2 ml. fresh sterile hydatid fluid produces a wheal and flare followed by indurated area of erythema in 12 hours.

6. LAPAROTOMY—Surgical exploration may be necessary when an extra-hepatic cause for cholestasis has been found or when the diagnosis is in doubt.

## 15. CIRRHOSIS OF LIVER

**Definition:** The term cirrhosis is applied to chronic diffuse liver disease of varied etiology, and characterised by hepatic cell necrosis, proliferation of connective tissue and nodular regeneration or in other words abnormal reconstruction of lobular architecture and disturbed hepatic circulation.

**Classification:**

**Pathological classification:**

1. *Micronodular cirrhosis* (portal or alcoholic cirrhosis). Characterised by thick, regular bands of connective tissue, by regenerating small nodules of almost same size and involvement of every lobule of the organ.
2. *Macronodular coarse cirrhosis* (post-necrotic, healed yellow atrophy). Liver reduced in size. Nodules of regenerating liver cells of different sizes intersected by fibrous bands of varying thickness containing proliferating bile ducts.
3. *Macronodular incomplete septal cirrhosis* (post-hepatitic). Least common variety. Liver usually reduced in size with coarsely nodular surface. Wide fibrous bands.

**Etiological classification:**

1. *Cryptogenic*—In many patients the factors that lead to the development of cirrhosis are unknown.
2. *Following infections*—(a) Viral hepatitis B. (b) Chronic active hepatitis. (c) Congenital syphilis.
3. *Induced by alcohol and drugs*—(a) Alcohol—produces liver damage if consumed in large amounts. Some progress to cirrhosis. (b) Drugs—Methotraxate. At times oxyphenisatin, monoamine oxidase inhibitors, halothane.
4. *Following biliary obstruction*—Stones, stricture, tumours, biliary atresia.
5. *Passive congestion*—Chronic congestive cardiac failure, chronic venous outflow obstruction, e.g., Budd-Chiari syndrome, veno-occlusive disease, sickle-cell anaemia.
6. *Malnutrition*—(a) *Protein deficiency*—Probably liver affected by malnutrition is more sensitive to injury which leads to cirrhosis. (b) *Food contaminants*—Sustained intake of plant and fungal alkaloids may lead to cirrhosis possibly by interfering with protein synthesis in the liver. A possible example is aflatoxin found in nuts and vegetables contaminated with Aspergillus flavus mycotoxins which may explain the high incidence of cirrhosis of unestablished etiology in tropical areas.

7. *Congenital*—(i) Hereditary haemorrhagic telangiectasia. (ii) Inborn errors of metabolism—(a) Galactosuria. (b) Type IV glycogen storage disease. (c) Tyrosinosis. (d) Alpha-l-antitrypsin deficiency. (e) Thallassemia. (f) Wilson's disease. (g) Haemochromatosis. (h) Cystic fibrosis.
8 *Miscellaneous*—(a) Primary biliary cirrhosis. (b) Indian childhood cirrhosis. (c) Sarcoid cirrhosis.

**Clinical features:**

*Symptoms and Signs*—of cirrhosis depend mainly on—(a) Liver cell insufficiency and (b) Portal hypertension.

1. ONSET—(a) *Vague* with anorexia, dyspepsia, weight loss, malaise and loss of libido. (b) *Dramatic* with jaundice, ascites or haematemesis. (c) *Asymptomatic* with hepatomegaly. (d) *Miscellaneous*—Swelling of ankles, diarrhoea, low grade fever.
2. HEPATIC—(a) *Hepatomegaly*—Liver may be palpable, non-tender, shrinks as disease advances. (b) *Jaundice*—Uncommon, when present it may be due to hepatocellular failure or intrahepatic cholestasis. (c) *Ascites*—develops gradually, rarely suddenly following trauma to abdomen, gut bleeding, acute infection or portal thrombosis. *Mechanism of ascites*—(A) *Systemic causes*—(i) Reduced plasma oncotic pressure due to low serum albumin. (ii) *Renal factors*—(a) Reduced glomerular filtration rate leads to sodium retention. (b) Hyperaldosteronism—causes increased sodium reabsorption in renal tubules. Due to hemodynamic changes occurring in cirrhosis, renal glomerular perfusion is decreased. The juxtaglomerular segments are stimulated to secrete renin which in turn brings about generation of angiotensin. Angiotensin stimulates aldosterone secretion by adrenals. (c) Third factor. Release of this factor causes increased sodium resorption distal to the proximal tubule. (iii) *Other hormonal influences*—(a) Excessive antidiuretic hormone secretion by pituitary causes water retention. (b) Defective metabolism of oestrogens and excessive quantities of these in the body may contribute to fluid retention. (B) *Local causes*—High pressure in portal circulation acts by—(i) Localizing fluid retention to abdominal cavity. (ii) Causing lymphatic congestion—Obstruction of hepatic venous outflow greatly increases formation of hepatic sinusoidal fluid. This drains into and consequently augments lymph flow in thoracic

duct. When the capacity of the hepatic lymphatic system is exceeded, protein-rich capillary fluid leaks from the surface of the liver into the peritoneal cavity. Ascites in cirrhosis may also be due to tuberculous peritonitis, spontaneous bacterial peritonitis or hepatoma.

3. DIGESTIVE—(a) *Haematemesis*—due to rupture of oesophageal varices may be the presenting symptom. Other evidence of collateral circulation are dilated periumbilical veins and haemorrhoids. (b) *Peptic ulcer.* (c) *Parotid enlargement.* (d) *Pancreatitis.*
4. ENDOCRINE—(i) *In male*—Gynecomastia, testicular atrophy, femininisation, reduced body hair, impotence. (b) *In female* —Lowered libido and usually atrophy of the breasts.
5. HAEMATOLOGICAL—(a) *Purpura.* (b) *Anaemia*—may be caused by bleeding, impaired conversion of folic acid into folinic acid, impaired metabolism of vitamin $B_{12}$ and haemolysis
6. DERMATOLOGICAL AND MUSCULOSKELETAL—(i) *Arterial spiders* (spider naevi)—central arteriole from which radiate numerous small vessels. May be seen in necklace area, face, forearm and dorsum of hand. May disappear with improving hepatic function. (ii) *Palmar erythema* (liver palms)—palms especially hypothenar and thenar eminences and pulps of fingers bright red in colour. (iii) *Alopecia*—Loss of pubic, axillary and facial hair; women may rarely develop masculine distribution of body hair. (iv) *White nails*—due to opacity of nail bed common. Clubbing may occur. (v) *Paper money skin*—Often associated with arterial spiders and in a similar distribution are numerous small vessels scattered in the skin. (vi) *Dupuytren's contracture.* (vii) *Muscle atrophy* (viii) *Erythema nodosum.*
7. CIRCULATORY—(a) *Hyperdynamic circulation* due to increased blood volume, associated anaemia, A-V shunting within the lungs and excessive vasodilator material due to failure of detoxification by the damaged liver. (b) *Clubbing* (c) *Cyanosis.*
8. NEUROLOGICAL—(a) *Portosystemic encephalopathy.* (b) *Peripheral neuropathy.*
9. RENAL—*Hepato-renal syndrome.* About 80% of patients dying from cirrhosis have renal failure and in majority of these it is functional renal failure (FRF)/acute tubular necrosis (ATN) or diuretic-induced. FRF/ATN may be precipitated by causes which impair hepatic and/or renal function, e.g., haemorrhage or sepsis, or may arise spontaneously.

**Management:** is palliative.

1. REST IN BED—till improvement continues.
2. DIET—Low salt. Total daily intake of 2000 calories with protein intake of 120 gm. if patient can tolerate it. Fats and carbohydrates in normal amounts. Vitamin B complex.
3. TREATMENT OF LIVER DISEASE—Abstinence from alcohol in the alcoholic. Steroids in case of chronic active hepatitis. Appropriate therapy in case of Wilson's disease and haemochromatosis.
4. DRUGS—(a) *Corticosteroids*—may help patient with active posthepatitis cirrhosis. Prednisolone is continued in a small maintenance dose of 10 mg. daily for many months. (b) *Immunosuppressive agents*—In case of troublesome side effects of corticosteroids. Azathioprine often of benefit in active-chronic hepatitis. Dose 50-75 mg. daily.
5. SYMPTOMATIC TREATMENT—
   (i) *Anaemia*—(a) Iron deficiency anaemia—Oral iron preparations or blood transfusion. (b) Macrocytic anaemia—Vitamin $B_{12}$ and folic acid. (c) In some patients hemodilution is the main cause since the red cell mass is normal or slightly increased. Here splenectomy is recommended since it results in decrease in plasma volume and consequent increase in haemoglobin concentration.

   (ii) RESTLESSNESS—All sedative drugs are potentially harmful but if patient becomes restless or noisy, phenobarbitone 180 mg. IM, or diazepam 5-10 mg. IM which has shorter duration of action and is useful for controlling minor convulsions that these patients may develop.

   (iii) **Ascites**—
   (a) *Low sodium diet*—Sodium intake upto 500 mg. daily. No salt in cooking. Milk restricted to 4 oz. and dairy products minimum. Sodium-free protein preparations can be given.
   (b) *Diuretics*—Frusemide 40 mg./day with Spironolactone 100 mg./day. If the response is not satisfactory, the dose of each drug can be doubled at interval of few days on two occasions. Once diuresis has occurred, maintenance therapy can be continued with spironolactone.

(c) *Paracentesis abdominis*—Removal of a small quantity of fluid may help initiate a diuresis. For indications for tapping see under ascites.

(d) *Reinfusion of ascitic fluid*—The ascitic fluid is aspirated water and electrolytes removed by ultrafiltration and the concentrated protein solution reinfused into the venous system Useful in the occasional unresponsive patient with severe ascites

(e) *Le Veen shunt*—may be considered for more permanent control of resistant ascites. With this method the ascites is directly connected to the venous system by a tube containing a pressure sensitive valve. Not free from complications

(f) *Cannulation of thoracic duct*—Since much of the ascites is said to be derived from hepatic lymph, this has been advised as a therapeutic procedure.

(D) **Haematemesis**—

(i) *Resuscitation*—Fresh blood transfusion, or if blood is not immediately available, saline drip till crossmatched blood can be obtained. Oxygen to combat anoxaemia. Vitamin K 25 mg.

(ii) *Prevention of protein breakdown*—The bowel lumen should be emptied by purging with Mag. sulph orally and by enemata until normal bowel contents are obtained. Neomycin 1 gm. 4-hourly should be given by mouth to decrease the bacterial breakdown of blood. Sedation is best avoided.

(iii) *Arrest of bleeding*—

(a) *Pitressin*—20 units diluted in 100 ml. of 5 per cent glucose IV over 20 minutes If effective it causes abdominal colic with

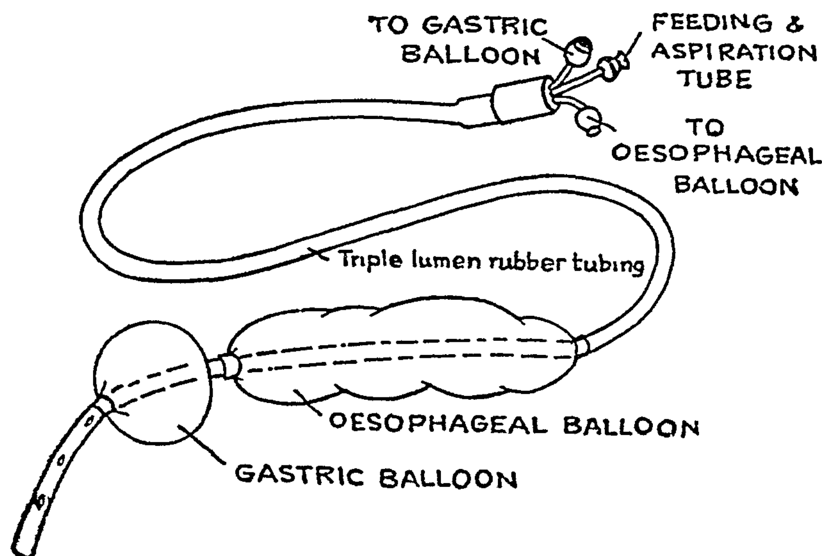



Fig 12 Sengstaken oesophageal tube.

10. Miscellaneous—(a) *Fever*—Low grade common due to bacteremia, or continuing hepatic cell necrosis, or infected ascites, or rarely due to development of hepatoma. (b) *Hydrothorax*—may occur in right pleural cavity.

**Investigations:**

1. *Blood*—(a) Anaemia—normocytic, normochromic; may be hypochromic if gastric haemorrhage. Occasionally macrocytic. (b) Low white cell count or reduced platelets due to hypersplenism. (c) Raised ESR from abnormal serum proteins. (d) Mitochondrial antibodies in biliary cirrhosis.
2. *Liver function tests*—may be normal in patients with compensated cirrhosis. Usually slight increase in serum transaminase, alkaline phosphatase and gamma globulin levels and fall in serum albumin level.
3. *Radiology*—
   (a) *Barium swallow*—Oesophageal and gastric varices.
   (b) *Transplenic portal venography*—Portal collateral channels, and disturbed intra-hepatic vascular pattern.
   (c) *Selective coeliac arterio-portography*—If splenic venography is not possible, selective catheterisation of coeliac axis can be performed following percutaneous puncture of femoral artery. The arteriographic phase will show characteristic corkscrew appearance of intrahepatic arteries in cirrhosis.
   (d) *Umbilical venography*—The obliterated umbilical vein can be cannulated under local anaesthesia following a midline incision half-way between umbilicus and xiphisternum. This allows direct readings of portal pressure from left portal vein and produces good hepatic venograms. Its main use is in patients with large collateral circulation.
   (e) *Liver scan*—In cirrhosis the hepatic uptake of colloid is reduced and patchy. The right lobe of the liver is often reduced in size. The spleen takes up more colloid.
4. *Histological*—Liver biopsy shows typical changes.
5. *Mechanical*—
   (a) *Proctoscopy*—to visualise haemorrhoids.
   (b) *Laparoscopy*—to visualise nodular liver surface. Distended vessels in falciform ligament over the peritoneum may indicate portal hypertension.
   (c) *Estimation of portal pressure*—(i) By measuring intrasplenic pressure. (ii) By measuring 'wedged' hepatic vein pressure.

(d) *Electroencephalogram*—in presence of neuro-psychiatric changes.

**Complications:**

1. *Due to portal hypertension*—Haematemesis, thrombosis of portal vein.
2. *Due to liver cell dysfunction*—Portosystemic encephalopathy.
3. *Due to formation of regeneration nodules*—Hepatoma.
4. *Mechanical due to ascites*—Herniae—Umbilical, inguinal or hiatus.
5. *Due to infection*—Tuberculosis, pneumonia, secondary bacterial peritonitis.
6. *Hypersplenism.*
7. *Chronic renal failure*—An end-stage complication.

**Differential Diagnosis:**

1. *Depending upon clinical presentation of—*
   (a) Hepatomegaly.
   (b) Haematemesis.
   (c) Splenomegaly.
   (d) Jaundice.
   (e) Ascites.
2. *Of two main types of cirrhosis—*

| | *Postnecrotic cirrhosis* | *Alcoholic cirrhosis* |
|---|---|---|
| Sex .. | More common in females | More common in males |
| Age ... | Any age | Usually middle age |
| Previous hepatitis . | Frequent | Rare |
| Liver ... | Small or normal | Large |
| Spleen ... | Usually palpable | Not palpable in about 75% |
| Ascites ... | ++ | + |
| Haematemesis (Oesophageal varices) | Frequent | Uncommon |
| Hepatic coma ... | Common | Rare |
| Pyrexia ... | Rare | Common |
| Obesity ... | Rare | Common |
| Special features ... | Nil | Delirium tremens, peripheral neuritis, parotid enlargement, Dupuytren's contracture. |

passage of melena stools and results in vasoconstriction of splanchnic arterioles and a decrease in portal pressure, the effect lasting for upto 4 hours. Local perfusion of 0.1-0.4 U per minute via selective arterial catheterisation into the superior mesenteric artery is less likely to produce ill effects.

(b) *Oesophageal tamponade*—with Sengstaken-Blackmore tube. The three lumen rubber tube with two balloons attached is passed through the mouth into the stomach. When it is in position, the gastric balloon is inflated with 20 ml. of a radio-opaque dye. The sausage-shaped oesophageal balloon is next distended with air. The tube is pulled up and attached with adhesive tape to the patient's face, or suspended over a pulley wheel allowing the weight of the apparatus to apply traction. The third lumen of the tube leads into the stomach for feeding and aspiration. Control of bleeding is indicated by improvement in the patient's condition, pulse and blood pressure and by obtaining a continuously clear gastric aspirate. Repeated pharyngeal suction to remove saliva and other secretions is required and the tube should not be left inflated for more than 24-36 hours. After bleeding has stopped for 24 hours the oesophageal balloon is deflated and traction taken off the tube. The tube is kept in the stomach for a further period of 24 hours and if bleeding does not recur, the fluid from the gastric balloon is aspirated and the apparatus removed. Complications which may be encountered are—oesophageal ulceration, obstruction to airway, regurgitation of blood and gastric contents into the air passages.

(c) *Cimetidine*—for gastric erosions.

(d) *Gastric hypothermia*—by circulation of ethanolwater mixture through a gastric balloon at temperature of 0°C. Cooling continued for 24-72 hours. Tolerated better than balloon tamponade but high incidence of pulmonary complications.

(e) *Emergency surgery*:

(i) *Acute portal decompression*—Cannulation of thoracic duct results in decongestion of liver and fall in portal pressure.

(ii) *Transoesophageal transgastric varix ligation*—Relatively small operation compared to shunting.

(iii) *Porta-systemic shunt*—Portacaval or splenorenal shunt.

(iv) *Transhepatic embolization and endoscopic sclerosis of veins*—especially in patients who are poor operative risks.

8. *Elective surgery*:
   (a) *Shunt operation*—mainly in cryptogenic and post-necrotic cirrhosis. Portacaval anastomosis or spleno-renal shunt. Requirements for successful porta-caval anastomosis are—(i) Adequate liver function. No jaundice, serum albumin more than 3g/100 ml, no ascites, no previous episodes of precoma. (ii) Age less than 50. (iii) Portal vein must be patent.
   (b) *Splenectomy*—Indications are: (i) Severe hypersplenism with platelet count below 50,000/mm. and (ii) Cirrhotic anaemia if hemodilution is the main cause.

## 16. ASCITES

**Causes:**

I **Diseases of peritoneum**—

(1) *Infections*—(a) Tuberculous peritonitis. (b) Spontaneous bacterial peritonitis. (c) Fungal—Candida, histoplasma. (d) Parasitic—Schistosoma, enterobius.
(2) *Neoplasms*—(a) Primary mesothelioma. (b) Secondary carcinomatosis, e.g. adenocarcinoma, sarcoma, teratoma, leukemia, Hodgkin's disease, lymphocytic lymphoma, myeloid metaplasia.
(3) *Pseudomyxoma peritonei.*
(4) *Familial paroxysmal peritonitis.*
(5) *Miscellaneous*—(a) Vasculitis—SLE and other collagen vascular disease, allergic vasculitis (Schonlein-Henoch purpura). (b) Eosinophilic gastroenteritis. (c) Whipple's disease. (d) Granulomatous peritonitis—Sarcoidosis, Crohn's disease, starch peritonitis. (e) Gynaecological lesions—Endometriosis, deciduosis. (f) Peritoneal lymphangiectasia. (g) Peritoneal loose bodies. (h) Peritoneal encapsulation.

II. **Portal hypertension**—

1. *Presinusoidal*—
   (a) Extrahepatic obstruction of portal vein due to sepsis, trauma, malignancy, pancreatitis, thrombotic states.
   (b) Intrahepatic obstruction of portal vein caused by reticuloendothelial diseases, sarcoidosis, schistosomiasis, congenital hepatic fibrosis, vinyl chloride, arsenic, copper.
   (c) Increased portal blood flow due to arteriovenous fistula, massive splenomegaly.

2. *Intrahepatic—*
   (a) Cirrhosis.
   (b) Nodular transformation of liver.
   (c) Veno-occlusive disease.
   (d) Hepatic venous obstruction.

III **Congestive cardiac failure—**

IV. **Hypoalbuminemia—**
   (a) Nephrosis. (b) Malnutrition. (c) Prótein losing enteropathy.

V. Beri-beri

VI. Myxoedema.

VII. Ovarian diseases—(a) Meig's syndrome. (b) Struma ovari. (c) Ovarian overstimulation syndrome.

VIII. Pancreatic ascites due to retroperitoneal leakage of pancreatic enzymes from a ruptured cyst or pancreatic duct.

IX. Bile ascites.

X Chylous ascites.

XI. Epidemic dropsy.

**Diagnosis and Investigation:**

I. HISTORY—

*Personal history*—Dietary habits and alcoholic intake. Menstrual history in females.

*Past history*—Of tuberculosis or jaundice. History of haematemesis or piles.

*Symptoms*—Gain in weight, increase in girth of abdomen, abdominal discomfort and dyspnoea on exertion. Mode of onset in relation to oedema of lower extremities or elsewhere. In cirrhosis the oedema always follows the ascites in contradistinction to other forms of oedema which precede the ascites.

II. PHYSICAL EXAMINATION—

1. ABDOMEN—*Inspection*—(a) Generalised distension of abdomen with bulging particularly in the flanks. (b) Umbilicus transversely stretched or everted. (c) Divarication of the recti abdominis and herniae may be seen due to raised intra-abdominal pressure. (d) Abdominal wall veins may be prominent due to obstruction of portal system or inferior vena cava or both. In inferior vena caval obstruction, the distribution of veins is more in the flanks and the venous channels course upwards and not radially from the umbilicus. (e) Asymmetrical oedema of legs due to venous thrombosis suggests intra-abdominal malignant disease or occlusion of inferior vena cava. *Ascites in absence of peripheral oedema* suggests cirrhosis, tuberculous peritonitis, constrictive pericarditis, restrictive cardiomyopathy,

hepatic venous occlusion or intra-abdominal tumour. *Palpation and Percussion*—(a) *Signs of free fluid in peritoneal cavity*—Shifting dullness, fluid thrill and horse-shoe shaped dullness. Puddle sign may reveal presence of as little as 300-400 ml of fluid. (b) Palpable spleen favours cirrhosis but may be found in hepatic vein occlusion or malignant disease with occlusion of splenic vein. (c) Liver is firm in cirrhosis but may be impalpable, it is large and nodular in malignancy. (d) Palpable glands and tenderness in tuberculous peritonitis.

2. *Rectal examination*—for haemorrhoids, malignant lesion in pelvis or fluid in pouch of Douglas.

III. SPECIAL INVESTIGATIONS—

1. ULTRASOUND AND CT SCANNING—As little as 100 ml of fluid can be detected Useful in very obese patients, or when there is confusion with other fluid collections such as ovarian cyst

2. ASCITIC FLUID—

(a) *Transudate or exudate*

| | *Transudate* | *Exudate* |
|---|---|---|
| Appearance | Clear | Turbid |
| Sp. Gravity ... | 1,000-1,015 | More than 1,015 |
| Proteins ... | Less than 2 5 gms % | More than 2 5 gms % |
| Cells ... | Few endothelial, occasional lymphocytes | Mostly lymphocytes |

*Transudate*—usually occurs in congestive heart failure, hypoalbuminemia, cirrhosis, inferior vena cava obstruction, Budd-Chiari syndrome, Meig's syndrome and vasculitis.

*Exudate*—is common in tuberculous peritonitis, peritoneal malignancy, bacterial peritonitis, pancreatic ascites, and myxoedema.

*Haemorrhagic fluid*—Traumatic tap, tumour, tuberculosis, acute haemorrhagic pancreatitis, mesenteric artery thrombosis.

*Chylous fluid*—Trauma to thoracic duct, filariasis, tuberculosis, malignancy involving thoracic duct.

(b) *Cells*—(i) *Red cells*—If fluid is haemorrhagic. (ii) *White cells*—Polymorphs in peritoneal irritation caused by inflammation, infection or tumour. Lymphocytes and monocytes in tuberculosis. Eosinophils in eosinophilic

enteritis and peritonitis. (iii) *Malignant cells* in carcinomatosis.

(c) *Biochemical tests*—(i) *Glucose*—Values less than 60 mg./100 ml. may suggest neoplastic effusion. (ii) *Ascitic amylase*—high in pancreatic ascites. (iii) *Triglycerides*—elevated in chylous ascites.

3. INVESTIGATIONS FOR SUSPECTED PORTAL VENOUS HYPERTENSION—
   (i) *Barium swallow*—for oesophageal varices.
   (ii) *Hepatic vein catheterization*—Increased hepatic vein pressure in intrahepatic portal obstruction associated with cirrhosis, normal pressure in extra hepatic portal obstruction. The pressure is measured by means of a catheter passed so as to block a hepatic vein (wedged hepatic vein pressure).
   (iii) *Transplenic portal venography*—Transplenic injection of radio opaque material will show extensive collateral circulation and dilatation of portal vein in portal hypertension. A portion of the dye passes into the collateral channels and bypasses the liver.
   (iv) *Intrasplenic pressure measurements*—will show a rise in portal hypertension.
4. *Liver biopsy*—of value in cirrhosis or malignancy of liver.
5. *Liver function tests*—to confirm cirrhosis.
6. *Liver scan*—for space occupying lesions of the liver.
7. *Laparoscopy*—Useful for (i) paracentesis, (ii) direct visualization of abdominal viscera, (iii) biopsy of liver.
8 *Selective arteriography*—of the hepatic and splenic arteries with delayed films to visualise the portal vein may be helpful in ascites of obscure cause.
9. *Needle biopsy of peritoneum*—for diagnosis of tuberculous and malignant peritonitis.
10. *Laparotomy*—may be required in some cases.

**Differential Diagnosis:**

**I. Other causes of abdominal distension—**

1. *Pregnancy*—History of amenorrhoea. Percussion dullness central with tympany in flanks. Little change in note on change of posture. Foetal parts may be palpable.
2. *Excessive fat*—Abdomen usually enlarged out of proportion to rest of body and pendulous. No shifting dullness or fluid thrill. Symmetrical globular enlargement with accentuation of cutaneous folds.
3 *Tumours*—Abdominal dullness limited to area overlying growth. In ovarian tumours, distance between xiphisternum

and umbilicus less than distance between umbilicus and symphisis. Vaginal examination diagnostic. Menstrual disturbances.

4. *Gaseous distension*—Tympanitic note, if colonic distension, most marked in periphery. Prominence of epigastrium if undue distension of stomach.
5. *Distended bladder*—An over-distended bladder may be felt as a somewhat tender and rounded cystic mass above the symphisis pubis and extending upwards even upto the umbilicus.
6. *Abdominal proptosis*—Distension produced by contraction of diaphragm and exaggerated lumbar lordosis which is obvious on clinical examination It is a psychiatric complaint
7. *Pneumoperitoneum*—Decrease or obliteration of hepatic dullness especially if patient placed in left lateral position.

## II. Other causes of ascites—

**A. Ascites only or with oedema of feet:**

| | 1 *Cirrhosis of liver* | 2. *T.B peritonitis* |
|---|---|---|
| Age | Usually middle age | Adolescent or young adults |
| Amount of fluid | Usually large | Small, moderate, or large |
| Liver | May not be palpable, if palpable firm and regular edge | Not enlarged |
| Fever | Absent | Present |
| Tenderness of abdomen | Rare | Common |
| Other features | Emaciation, dyspepsia, evidences of collateral circulation, liver function impaired | Primary focus in the lungs may be found. Lumps of matted omentum may be palpated |
| Ascitic fluid | Transudate | Exudate Guinea pig inoculation reveals tubercle bacilli |
| Peritonescopy | Nodular liver surface | Peritoneum studded with small granulomas |

3. *Malignant peritonitis*—Diffuse abdominal pain and weight loss. Spleen not palpable. Peritoneal fluid haemorrhagic. Diagnosis by cytology, peritoneal biopsy or peritoneoscopy.
4. *Portal hypertension* (other than cirrhosis)—
   (a) *Obstruction to portal vein by enlarged glands*—Presence of primary growth or enlarged lymph nodes elsewhere. Progressive jaundice.

(b) *Thrombosis of portal vein*—Rapid development of ascites, hematemesis, melena and splenomegaly.

5. *Constrictive pericarditis*—(a) Presence of signs of congestive failure without signs of heart disease. (b) Impalpable apex beat. (c) Rise of jugular venous pressure on inspiration. (d) Hepatomegaly and ascites. (e) 3rd heart sound (Pericardial knock sound). (f) Pulsus paradoxus. (g) Calcification of pericardium may be observed on fluoroscopy with a relatively small heart showing little pulsation.
6. *Hepatic vein thrombosis (Budd-Chiari syndrome)*—Onset of hepatic vein obstruction indicated by pain, hepatic enlargement, vomiting and ascites. Liver large and tender. Failure of jugular veins to fill when liver is pressed. Thrombosis of major venous channels such as portal vein will cause abdominal pain, ascites and bloody diarrhoea, while blockage of inferior vena cava may lead to albuminuria, prominent veins in the loin and rarely nephrotic syndrome. Ascitic fluid—high protein content. Liver biopsy shows congestive changes in centrilobular zones. Catheterization of inferior vena cava and injection of radio-opaque dye may show venous obstruction.
7. *Chylous ascites*—Due to obstruction of receptaculum chyli and thoracic duct by filariasis, neoplasms (intra-abdominal or thoracic), inflammations (mesenteric adenitis, tuberculosis, pancreatitis), traumatic rupture of thoracic duct, or idiopathic. Turbid fluid which separates into layers and contains lymphocytes.
8. *Spontaneous (primary) bacterial peritonitis*—Diagnosis should be considered in (i) Patients with pre-existing ascites who develop fever or changing abdominal signs and symptoms. (ii) Patient with a focus for bacteremia such as indwelling catheters, cellulitis, or urinary, biliary or pulmonary infection. (iii) Patients with decreased immunological competence e g. hypogammaglobulinemia.
9. *Meig's syndrome*—Triad of ascites, hydrothorax and fibroma of the ovary. The hydrothorax and ascites disappear when the ovarian tumour is removed.
10. *Pseudomyxoma peritonei*—due to rupture of mucocele of appendix or pseudomucinous cyst of ovary. Increasing abdominal girth, and occasional attacks of abdominal pain Abdominal masses may be palpable, there is often a fluid thrill and sometimes shifting dullness Disparity between amount of ascites and clinical state of patient On paracentesis mucinous material often too sticky to be aspirated
11. *Pancreatic ascites*—Intermittent abdominal pain with massive, chronic, refractory ascites Serum amylase elevated.

12 *Bile ascites*—Extravasated bile may cause chronic peritoneal fluid accumulation Abdominal distension after biliary tract surgery. Nausea, malaise, jaundice and acholic stools Paracentesis yields bilious fluid.

13 *Myxoedema*—Impaired mentation often without other features of the disease Yellow gelatinous fluid with proteins generally more than 4 gm. per 100 ml. Ascites clears within 2-3 weeks after starting thyroxine.

**B. Ascites with generalised anasarca:**

| 1. *Congestive cardiac failure* | 2. *Nephrosis* |
|---|---|
| Starts in feet | Starts as puffiness of face |
| Oedema maximum in evening | Oedema maximum in morning |
| Cyanosis | Pallor |
| Raised JVP | JVP normal |
| Heart always enlarged | Cardiac enlargement rare |
| Liver enlarged and tender | Liver not palpable. Oedema of abdominal wall common |
| Proteinuria usually trace | Massive proteinuria |

3. *Anaemia and hypoproteinemia*—(a) Gross anaemia. (b) Marked oedema of feet. (c) Ascites slight or moderate. (d) Spleen may be enlarged. (e) Serum proteins diminished, reversal of albumin globulin ratio.
4. *Beriberi*—(a) Symptoms of cardiac involvement (b) Heart enlarged. (c) Tachycardia. (d) Tenderness of calf muscles and blunting of sensations. (e) Oedema firmer than that of nephrosis and does not involve scrotum. (f) Absent or sluggish deep reflexes. (g) Decreased urinary output of thiamine.
5. *Epidemic dropsy*—(a) Oedema of legs occurring in several members of the family, or several individuals in same locality. (b) Marked tenderness over oedematous parts in most cases and severe burning of feet with paraesthesiae in majority. (c) Preceding or accompanying gastro-intestinal symptoms. (d) Diffuse blotchy erythema of skin. (e) Presence of cardiovascular symptoms. (f) Glaucoma (g) Cutaneous nodules. (h) Detection of argemone oil in cooking medium.

**Management:**

OF CAUSE—e.g. Digitalis for cardiac failure, anti-tuberculous drugs, T.B. peritonitis, pericardiolysis for constrictive pericarditis, Vitamin $B_1$ for beriberi. In the Budd-Chiari syndrome, membranous obstruction to IVC needs to be treated surgically.

OF ASCITES ITSELF—

1. *Diet*—Low sodium diet if fluid non-inflammatory.
2. *Diuretics*—Frusemide or spironolactone.
3. **Abdominal paracentesis**—

*Indications*—(i) Marked abdominal discomfort. (ii) Cardiac or respiratory embarrassment. (iii) Oliguria resulting from impaired renal blood flow. (iv) Anorexia and dyspepsia. (v) Following haematemesis in cirrhosis to reduce congestion. (vi) Patients refractory to full medical therapy. (vii) Danger of strangulation of secondary herniae.

*Technique*—Ask patient to empty his bladder and prop him up in bed. After local anaesthesia at the site of puncture in the midline half-way between the umbilicus and pubis, or in the flank, a scalpel incision is made in the skin and a large bore needle about 3½ inches long is introduced into the peritoneal cavity. The fluid is drained slowly through a rubber tubing connected to the needle. An abdominal binder or many-tailed bandage is placed round the abdomen and it is tightened as required.

*Complications and Management*—

(a) *Fainting*—due to too rapid removal of fluid. Further removal should be stopped. If recovery is slow administer 500 ml. 5% glucose IV. If marked fall in B P. 200 ml. 5% saline by infusion.

(b) *Infection*—Acute peritonitis very rare but chronic infection may result from repeated paracentesis. If organism is cultured from sample of fluid give appropriate antibiotic.

(c) *Perforation of viscus*—rare. Usually gives rise to localised peritonitis treated with streptomycin and broad spectrum antibiotic.

(d) *Acute liver failure.*

(e) *Depletion of proteins*—Removal of 5 litres of ascitic fluid may involve loss of 50-100 gm. protein.

## 17. HEPATOMEGALY

**Causes:**

1. INFECTIONS:

*Viral*—Viral hepatitis, yellow fever, infectious mononucleosis, Lassa fever.
*Spirochetal*—Weil's disease, syphilis, relapsing fever.
*Bacterial*—Typhoid, pneumonia, brucellosis, tuberculosis.
*Protozoal*—Amoebiasis, malaria, kala-azar.

*Parasitic*—Schistosomiasis, echinococcus, clonorchiasis. *Fungal*—Actinomycosis, histoplasmosis.

2. TOXIC HEPATITIS—Carbon tetrachloride, arsenic, phosphorous, cincophen, sulphonamides, chlorpromazine, methyltestosterone, halothane.
3. DEGENERATIVE—Fatty infiltration and early cirrhosis.
4. CONGESTIVE HEPATOMEGALY—
   (a) *General*—Congestive cardiac failure, tricuspid regurgitation, constrictive pericarditis.
   (b) *Local*—Portal hypertension (cirrhosis), hepatic vein thrombosis.
5. TUMOURS AND CYSTS—*Tumours*—(a) Primary · Benign and malignant hepatoma, benign and malignant cholangioma, fibroma, sarcoma, hemangioma. (b) Secondary—Direct due to spread by contiguity, or embolic metastatic. *Cysts*—Polycystic disease, solitary cyst parasitic or non-parasitic, malignant pseudocysts.
6. BILIARY OBSTRUCTION—Gall stones, strictures of bile ducts.
7. RETICULOSIS—Hodgkin's disease, leukemia.
8. STORAGE DISORDERS—Gaucher's disease, Niemann-Pick's disease, amyloidosis, glycogen storage disease, gargoylism, haemochromatosis.
9. MYELOID METAPLASIA—Secondary carcinoma of bone, myelofibrosis, myelosclerosis, multiple myeloma, marble-bone disease.
10. GENETIC ABNORMALITIES—sickle cell disease.
11. CONGENITAL—Riedel's lobe.

**Differential Diagnosis of Hepatomegaly:**

1. HEPATITIS—(a) *Viral hepatitis*—Prodromal symptoms of gastro-intestinal upset, abdominal discomfort, anorexia, malaise and fever. Dark urine. Enlarged tender liver with smooth edge. Spleen palpable. Lymphnodes may be felt. (b) *Amoebic hepatitis (or abscess)*—Moderate to huge enlargement of liver, pain in hepatic region and liver tenderness. Moderate pyrexia, at times fever with rigors. Caecal tenderness may be found and history of diarrhoea with mucus and blood may be obtained. Spleen not palpable. Moderate leucocytosis. Screening will reveal restricted diaphragmatic movements. Diagnostic aspiration may show anchovy sauce pus if abscess. At times the only method of differentiating amoebic hepatitis from abscess may be by observing the disappearance of symptoms in the case of hepatitis after 3 days of emetine injections. (c) *Acute alco-*

*holic hepatitis*—Commonly follows a period of heavy drinking. Right upper abdominal pain, anorexia, nausea and vomiting, and profound weakness. Jaundice common. Fever may occur. Liver usually enlarged and tender. Spider naevi may develop. (d) *Chronic active hepatitis*—High preponderance in young females. *Clinical features*: (i) Hepatic—Jaundice, spider naevi, enlarged spleen. (ii) Nonspecific—Pyrexia, malaise, lethargy, etc. (iii) Multisystem features—Rashes, arthritis, pleurisy, pericarditis, myocarditis, nephritis, etc. *Immunological features*—Presence of smooth muscle antibody, antinuclear factor, LE cells and antimitochondrial antibody may be found. *Liver biopsy*—shows piecemeal necrosis and inflammatory infiltration.

2. PORTAL CIRRHOSIS—(i) Evidence of hepatocellular damage—Dyspeptic symptoms, vascular spiders, alopecia, palmar erythema. Palpable liver in about 75% of patients. (ii) Evidence of portal hypertension—Palpable spleen, ascites in later stages, oesophageal varices, haemorrhoids.
3 CHRONIC PASSIVE CONGESTION—Slight to huge enlargement of liver. Edge firm, smooth and tender on palpation. Spleen may be palpable. Ascites in severe cases. Increased venous pressure and other signs of congestive failure. Pulsatile liver if tricuspid incompetence.
4. CARCINOMA OF LIVER—Large size and gross nodularity of liver, hard and sometimes tender. Rapidly enlarging solitary mass in connection with the liver may be observed occasionally. Ascites and oedema of legs common. Jaundice of variable degree. Spleen rarely palpable. Cachexia, loss of weight and rapid course. Presence of primary, or of pre-existing cirrhosis. Friction rub due to perihepatitis occasionally heard over the tumour, an arterial murmur may also be heard. Presence of alpha-fetoprotein in serum. A high level of alkaline phosphatase with normal or only slightly raised plasma bilirubin suggests an intrahepatic space-occupying lesion Radio-isotopic scanning will help to localise the tumour
5. MALARIA—Liver may be palpable in about half the cases. Spleen always palpable Jaundice rare, transient. Fever with rigors. Demonstration of malarial parasites, and therapeutic response to antimalarial drugs.
6. ALCOHOLIC FATTY LIVER—Liver enlarged, smooth, firm, nontender. No enlargement of spleen. One may sometimes find hemolytic anaemia, jaundice and turbid serum due to

hyperlipedemia or marked cholestasis suggesting extrahepatic obstruction.

7. KALA-AZAR—Some degree of liver enlargement always present. Progressive enlargement of spleen, long continued fever, loss of weight, anaemia, bleeding tendencies and increasing darkness of complexion. Demonstration of Leishman-Donovan bodies in sternal smear.
8. LEUKEMIA—Smooth enlargement of liver, moderate in myeloid, gross in lymphatic leukemia, massive splenomegaly, anaemia. Blood picture or at times needle biopsy of liver confirms diagnosis.
9. HODGKIN'S DISEASE—Liver may be enlarged. Fever common, often intermittent Pel-Ebstein type. Mild icterus common. Enlarged glands. Aspiration gland biopsy or hepatic biopsy if no accessible gland.
10. PYOGENIC LIVER ABSCESS OR ABSCESSES—Pain and tenderness localised in hepatic area, chills and fever. High leucocyte count. On fluoroscopy elevated diaphragm or absence of motion of the right diaphragm. Positive blood culture of pus or tissue aspirated from liver helpful in diagnosis and treatment.
11. MILIARY TUBERCULOSIS—Tender liver edge. Pyrexia, Concomitant active tuberculosis elsewhere and other features of hematogenous dissemination.
12. BILIARY CIRRHOSIS—

| | *Portal cirrhosis* | *Biliary cirrhosis* |
|---|---|---|
| Incidence | Common | Rare |
| Age | 40-60 | Any |
| Sex | Male | Female |
| Malnutrition | Frequent | Rare |
| Jaundice | Uncommon, mild | Always present, marked |
| Liver | May be small | Always markedly enlarged |
| Spleen | Enlarged | Slight enlargement |
| Ascites | Frequent | Rare and late |
| Xanthomas | Absent | May be seen |
| Serum cholesterol | Normal or diminished | Elevated |
| Mitochondrial antibodies | Absent | Present |

13. TROPICAL SPLENOMEGALY SYNDROME (*TSS*)—Gross splenomegaly with moderate hepatomegaly in immune adults from areas of endemic malaria. High serum IgM.

14. BUDD-CHIARI SYNDROME (Hepatic venous obstruction)—Liver enlarged and tender. Ascites. Failure of jugular vein to fill when liver is pressed. Ascitic fluid of high protein content and may be blood stained.

15. SICKLE CELL DISEASE—Moderate enlargement of liver with jaundice. Sickled red cells.

16. HYDATID CYST—Firm, smooth, non-tender liver. No jaundice, no splenic enlargement. History of contact with dogs. Hydatid thrill may be elicited. Eosinophilia. Calcified cysts on liver scan. (Positive complement fixation test and intradermal test in many cases.)

17. *Syphilis of the liver*—Firm irregular enlargement Stigmata of syphilis and positive serology. Therapeutic test in doubtful cases with iodides and penicillin will produce reduction of swelling and of local tenderness.

18 *Schistosomiasis*—Hepatomegaly with portal hypertension, splenomegaly and oesophageal varices. Diagnosis is established by remnants of eggs of schistosoma, pigments, granulomas and portal fibrosis on liver biopsy.

19. *Hemochromatosis*—Triad of cirrhosis, diabetes mellitius and pigmentation of skin Much more common in males. Liver markedly enlarged, hard, usually smooth and in some cases tender. Spleen palpable in 50 per cent cases. Ascites rare Cardiac complications may occur. Demonstrable increased stores of iron in serum Liver biopsy shows characteristic pigmentary cirrhosis.

20. *Clonorchiasis*—due to infestation with Clonorchis sinensis (liver fluke). Advanced disease is characterised by hepatomegaly, ascites and oedema Malignant change may lead to carcinoma of bile ducts or liver. Eosinophilia and raised alkaline phosphatase Diagnosis confirmed by demonstration of eggs in faeces or in bile obtained by duodenal intubation.

21. *Amyloidosis*—Liver usually large, smooth, rubbery and nontender. Jaundice and ascites may occur. Generalised oedema common Albuminuria and evidence of chronic sepsis or rheumatoid arthritis Liver function tests normal. Congo red test positive Aspiration liver biopsy, or kidney biopsy shows amyloid material.

22 *Myeloid metaplasia*—Can occur in conditions of bone marrow replacement or irritation. Liver enlarged with firm smooth edge. Massive spleen. Jaundice rare. Liver function tests normal. Primitive leucocytes or red cells in the peripheral blood

23. *Gaucher's disease*—Hepato-splenomegaly, pigmentation of exposed parts. Wedge-shaped thickening of conjunctivae at angles of eyes Spontaneous bone fractures or bone pain with fever. X-rays of long bones like femur show expansion of lower end. Sternal marrow will show large pale Gaucher cells with fibrillary cytoplasm and eccentric hyperchromatic nuclei.

24. *Niemann-Pick Disease*—Occurs in infants. Weight loss. Enlargement of liver and spleen. Yellowish brown tint of skin Enlargement of superficial lymph glands Blindness and deafness. Bone marrow puncture shows the foamy Niemann-Pick cell.

25. *Von Gierke's disease*—Liver grossly enlarged, firm and smooth. Physical retardation No splenomegaly, portal hypertension or jaundice Hypoglycemic symptoms and low fasting blood sugar. Aspiration liver biopsy shows loading of liver cells with glycogen.

## 18. LIVER FUNCTION TESTS

**Indications :**

1. Detection of liver damage in absence of jaundice.
2. Differential diagnosis of jaundice.
3. As an aid in prognosis and to determine response to medical treatment.
4. Differential diagnosis of hepatic enlargement.
5. Existence of excessive hemolysis (Investigation of anaemia).

**Classification :**

**1. Tests depending on biliary excretion :**

TOTAL SERUM BILIRUBIN: Normal range—upto 1.5 mg/100 ml (conjugated and unconjugated). Blood level of conjugated bilirubin exceeding 0.2 mg/100 ml occurs with parenchymal liver disease or extrahepatic obstruction. Rise in unconjugated fraction occurs with overproduction (e.g. hemolysis) and with failure of uptake or conjugation.

URINE BILIRUBIN : Water soluble bilirubin esters appear in urine when plasma levels are high. *Negative result*—unconjugated hyperbilirubinemia. *Positive result*—most other cases of jaundice.

BROMSULPHTHALEIN RETENTION : Bromsulphthalein is a dye which when injected intravenously accumulates in the liver and is then excreted in the bile. Abnormal retention indicates failure of biliary excretion. The test is carried out by giving 5 mg./kilogram of body weight and noting the retention of dye after 45 minutes. Normal value is 0-5 per cent at 45 minutes. It is a good test for assessing the total functioning hepatic mass in the non-jaundiced patient. It is of little value in the presence of jaundice since some dye retention is seen in all types.

*Serum flocculation tests*: These tests are potentiated by serum gamma-globulin and are inhibited by albumin. Hence positive results are found in any condition in which the ratio is disturbed High proportion of positive results are found in viral hepatitis Normal: Thymol turbidity 0 to 4 units Thymol flocculations 0 to 1 +. Cephalin cholesterol 0 to 4 +. Collodial gold 0.

**2. Serum proteins:**

NORMAL VALUES:

| *Chemical method* | *Electrophoretic method* |
|---|---|
| Albumin 3.5 to 4 g/100 ml | Albumin 4.9 g./100 ml (55-70%) |
| Globulin 2.5 to 3 g./100 ml | Globulin total 2.8 g./100 ml (30-45%) |
| Total 6.7 g./100 ml | |
| | $\alpha_1$ globulin, $\alpha_2$ globulin } 9-15% |
| | β-globulin 7-15% |
| | γ-globulin 6-16% |

ABNORMAL VALUES:

A fall in serum albumin indicates serious grade of liver damage. Disorders of liver having an inflammatory component usually give rise to increase in serum globulin. $\alpha_1$ globulin tends to be low in hepato-cellular disease. In cholestasis increase in $\alpha_2$ and β globulin. γ globulin rise in hepatic cirrhosis.

**3. Serum enzymes:**

SERUM ALKALINE PHOSPHATASE: Normal 3 to 13 K-A units (21-100 IU/1). It is the best index of the factor of biliary patency and is raised in obstructive jaundice. Elevation of serum alkaline phosphatase is especially significant in the non-jaundiced patient as a sign of partial obstruction of the biliary tree by silent stone, stricture etc., or an expanding lesion in the liver such as neoplasm or abscess. It is also raised in bone disease and in pregnancy.

SERUM TRANSAMINASES:

*Serum glutamic oxalacetic transaminase* (SGOT)—Normal. 5-15 units. Very high values in hepato-cellular necrosis (and myocardial infarction).

*Serum glutamic pyruvic transaminase* (SGPT)—Normal 4-13 units. Increase more specific for liver disease than SGOT.

*Serum 5-nucleotidase*—Normal 1 to 15 IU/1. Raised in liver disease especially with biliary obstruction. Often used to confirm that high phosphatase is hepatic in origin.

*Serum aspartate transaminase* (*AsT*)—Normal 5-15 IU/1. Raised in many types of liver disease.

*Alanine transaminase* (*AlT*)—Normal 5-30 IU/l. Raised in liver disease.

*Serum γ-glutamyl transpeptidase* (GTT)—Normal 7-30 IU/l in men, 10-48 IU/l in women. Raised in most kinds of liver disease. Also in chronic alcoholic excess.

4 **Prothrombin time (PT) and partial thromboplastin time (PTT):** Normal PT 10-14 secs., PTT 32-42 secs. Both tests depend on the presence of factors I, II and X. Persistence of reduced PT or PTT after 3 days of treatment with vitamin K suggests severe hepatic damage.

*Selection of tests*:

1. To find out presence or absence of jaundice—Urine bilirubin or serum bilirubin estimation. Absence of urine bilirubin in a jaundiced patient suggests haemolysis.
2. In liver disease without jaundice—If there is no abnormality of AsT, γ-glutamyltransferase and alkaline phosphatase, liver disease is unlikely, though with well compensated cirrhosis there may be no abnormalities. Very high AsT suggests acute hepatitis. AsT : ALT ratio > 2 is indicative of alcoholic liver disease. In established cirrhosis, serum albumin values below 2 gm./100 ml. indicate bad prognosis.
3. For differential diagnosis of jaundice—see p. 50.

## 19. LIVER BIOPSY

**Indications:**

1. *Jaundice*—If a non-dilated biliary system is demonstrated on imaging techniques liver biopsy is necessary. (a) Biliary tract disease can be differentiated from hepatocellular disease e.g. acute and chronic hepatitis. (b) Drug-induced hepatitis or cholestasis may also be diagnosed.
2. *Chronic hepatitis*—Diagnosis, prognosis and treatment of chronic hepatitis are based on histological appearances.
3. *Cirrhosis and portal hypertension*—Apart from diagnosis of cirrhosis, the cause of the cirrhosis can be diagnosed histologically in alcoholic abuse, hepatitis B, biliary disease, venous outflow block, haemochromatosis, $\alpha_1$-antitrypsin deficiency and storage diseases. It may help to establish cause of portal hypertension. Normal liver tissue is seen in portal vein thrombosis.
4. *Hepatomegaly*—Diagnosis of fatty liver, cirrhosis, malignant infiltration, and amyloidosis. Storage diseases (microscopy and biochemical analysis), haemochromatosis (iron liver iron content can also be estimated), Wilson's disease (liver copper content).

5. *Alcoholic liver disease*—In the alcoholic patient biopsy differentiates between simple fatty liver and alcoholic hepatitis. Confirmation of cirrhosis is easy.
6. *Infections (including pyrexia of unknown origin) and systemic diseases*—Finding of granulomas may help establish diagnosis of tuberculosis, sarcoidosis or brucellosis.
7. *Liver tumours*—including malignant tumours. Staging of lymphomas.
8. *Unexplained abnormalities of liver function.*
9. *Screening of relatives of patients with familial hepatic disease.*

**Contraindications:**

1. Abnormal blood clotting.
2. Presence of infection in liver, peritoneum or biliary tract
3. Severe hepatocellular failure.
4. Passive congestion of liver.
5. Gross ascites.
6. Hydatid disease.
7. Hemangioma.
8. Right empyema.
9. Subphrenic abscess.

**Procedure:**

*Precautions and preparation*—(a) Any history of bleeding should be investigated. (b) Blood group should be known and transfusion facilities should be available. (c) Haemoglobin should be more than 10 g/100 ml, platelet count 80,000/mm$^3$ or more and prothrobin time should not be prolonged more than 3 seconds. If vitamin K 10 mg. IM daily for 2 doses does not improve PT sufficiently, fresh frozen plasma may be tried and used again to cover the procedure. (d) If there is ascites, the abdomen should be tapped before doing the biopsy. (e) A sedative such as diazepam may be given half hour before the procedure.

*Technique*: The patient lies on his back in bed with the right side very near the edge of the bed. The point of maximum dullness to percussion at full expiration in the right midaxillary line in the 8th to 10th intercostal space is marked. After skin antisepsis, 1% lignocaine is used to anaesthetise down to the liver capsule. Either the aspiration technique may be employed using the Menghini needle or a puncture procedure with Vim-Silverman needle. *Menghini needle biopsy*—3 ml. of sterile saline solution is drawn into a syringe with the needle attached. The needle is inserted upto the intercostal space but not through

it. About 2 ml. of the solution in the syringe is injected to clear the needle of any skin fragments. Aspiration is now begun and maintained. Now with the patient holding his breath in expiration, the needle is quickly inserted into the liver substance. It is then quickly withdrawn and the tip of the needle placed under saline in a glass receptacle. The advantages of this method are little discomfort to the patient and no distortion of biopsy specimen.

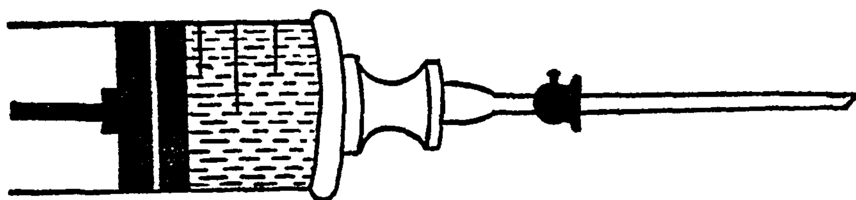


Fig 13 Menghini liver biopsy needle

*Vim-Silverman method*—The instrument consists of trocar and cannula which are pushed into the liver. The trocar is removed and the biopsy punched out by introducing a longer longitudinally split cannula. The short cannula is then advanced until the tips of both are level. The instrument is then rotated to break off the end of the biopsy and then withdrawn.

*After-care*—Patient must rest in bed for 24 hours. Pulse and B.P. should be measured every 15 minutes for first 2 hours and then 2 hourly. Analgesics may be given for pain.

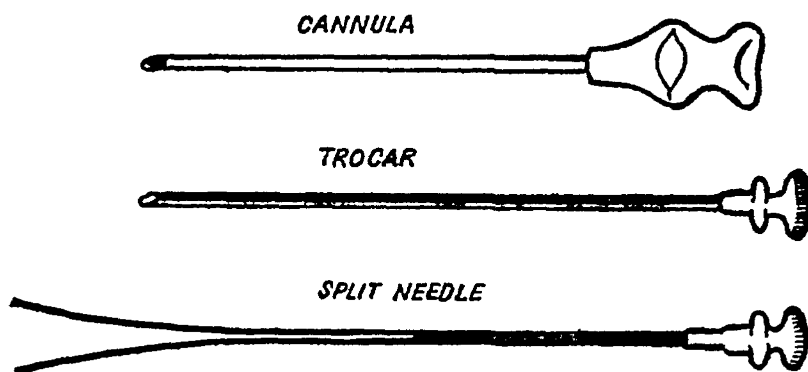



Fig. 14 Vim Silverman liver biopsy needle

**Complications:**

1. *Puncture of gall-bladder or major bile ducts*—Bile leakage causes immediate severe abdominal pain progressing to biliary peritonitis.

2. *Haemorrhage*—from capsular tears. Haemobilia causes biliary colic accompanied by malena and bilirubinuria.
3. *Cholangitis*—may occur particularly in patients with large bile duct obstruction.
4. *Puncture of viscera*—such as kidney or colon usually without sequelae. Pancreatic puncture may be serious.

## 20. CHOLECYSTITIS

### Acute Cholecystitis

**Etiology:** Acute inflammation of gall-bladder is almost always associated with gallstones. The aphorism "gallstones most commonly occur in fat, fertile, flatulent females between forty and fifty" is fairly factual. The production of inflammation in cholecystitis depends on obstruction to outlet of gall-bladder by gallstone in majority. Basic abnormality in gallstone formation is imbalance of the three main constituents of bile—phospholipid, cholesterol and bile salts. Bile salts are the detergents keeping cholesterol in solution; when there is imbalance cholesterol is deposited.

**Symptoms:**

1. *Pain*—The pain may be prolonged, unlike biliary colic and may be one of 4 types—(i) *Distension pain* giving rise to a deep, central, poorly localised pain. (ii) *Peritoneal pain* with overlying skin tenderness and muscle rigidity in right hypochondrium. (iii) *Referred pain* radiating to back or right shoulder. (iv) *Digestive tract pain* causing abdominal colic, nausea and flatulence without vomiting.
2. *Other dyspeptic symptoms*—(a) Nausea and vomiting due to reflex hold up at pylorus. (b) Heart burn and water brash due to reflux and salivation. (c) Flatulence and distension due to gaseous distension of stomach.
3. *Chills*—may occur at onset.

**Signs:**

*General*—(a) Pyrexia and tachycardia. (b) Jaundice in about 25%.

*Local*—

1. *Tenderness and muscle guarding*—Maximum tenderness in right upper quadrant, sometimes only on deep inspiration. Guarding and board-like rigidity of the right upper abdominal muscles.
2. *Palpable mass*—of globular shape below right costal margin and moving on respiration may be felt.

3. *Abdominal distension*—may occur and if marked simulate intestinal obstruction.
4. *Murphy's sign*—Patient complains of pain on taking a deep breath while the examiner's hand is pressed below the right costal margin.
5. *Boas's sign*—Area of hyperaesthesia over right subscapular region.

INVESTIGATIONS:

1. *Leucocytic count*—raised with increased polymorphs.
2. *X-ray*—Plain film of the abdomen may reveal radio-opaque gall-stones or soft tissue mass in region of gall-bladder.

**Complications:**

1. *Cholangitis*—Spread of inflammation results in rigors, swinging fever, jaundice and deterioration of general condition.
2. *Acute pancreatitis*—Severe pain referred as a band round the abdomen and eased by leaning forward.
3. *Septicemia and shock.*
4. *Empyema of gall-bladder*—Gangrene may lead to perforation and general peritonitis.

**Management:**

1. *Rest in bed.*
2. *Diet*—Nothing by mouth for first 24 hours, or till nausea and vomiting have abated.
3. *Drugs*—(a) Morphia or pethidine with atropine. (b) Antibiotics to prevent peritonitis, cholangitis and septicemia. Oxytetracycline 500 mg. or Ampicillin 500 mg. every six hours for 7 to 10 days, or Gentamycin 80 mg. 8 hourly I.M.
4. *Special measures*—(a) Local heat to abdomen. (b) 5% glucose saline intravenously. (c) T.P.R. 2 hourly. (d) Examine abdomen every 2 hours to follow changes in tenderness, rigidity, and character of any palpable mass. (e) Total and differential WBC count. (f) Gastric suction if persistent vomiting.
5. *Operative treatment*—Cholecystostomy with drainage with elective cholecystectomy after few weeks. Indications—(a) Continuous rise of temperature and pulse rate. (b) Increase of local signs of inflammation, and unabated continuation of abdominal tenderness or biliary colic. (c) Progressive rise of leucocyte count.

## Chronic Cholecystitis

1. CALCULUS CHOLECYSTITIS—Since chronic cholecystitis is almost always associated with gall stones, etiological factors include all those responsible for formation of gall stones. (i) *Age and Sex*—Prevalence rises steadily with age, 2-3 times more common in females. Child bearing increases the prevalence. (ii) *Obesity*—common. (iii) *Associated conditions*—Incidence increases with diabetes mellitus and raised serum triglycerides. Extensive disease of terminal ileum (by interfering with bile salt reabsorption), pancreatitis. Increased incidence in those taking clofibrate, oestrogen replacement therapy, and oestrogen containing contraceptive pill. Pigment stones in cirrhosis and hemolytic anaemia. (iv) *Race*—High incidence in Indian women of American South-west.

2. ACALCULUS CHOLECYSTITIS—rare. May occur in typhoid fever, in patients on steroids and in polyarteritis.

**Clinical Features:**

CHRONIC CHOLECYSTITIS—Clinical features usually ill-defined. Abdominal distension or epigastric discomfort which is relieved by belching, nausea (without vomiting) and a dull ache in right hypochondrium, epigastrium and right subscapular region. Fat intolerance may occur. There is localised tenderness in right hypochondrium and positive Murphy's sign.

CHOLEDOCHOLITHIASIS (Common bile duct stones)—*Symptoms*—Triad of: (i) Pain—Severe and colicky, either epigastric or right hypochondrial. Often radiates to back and right scapula and associated with vomiting. (ii) Jaundice—Cholestatic jaundice is usually mild and may be associated with pruritus. With a ball-valve type of obstruction, it may fluctuate from day to day. (iii) Fever—Either continuous or intermittent followed by rigors and sweating (Charcot's intermittent biliary fever). *Signs*—Tenderness in right hypochondrium and often most marked over junction of upper 2/3 and lower 1/3 of a line extending from tip of 9th costal cartilage to the umbilicus (Mayo Robinson's point).

**Diagnosis:**

1. *Plain x-ray of abdomen*—may show gallstones (about 20% are opaque), soft tissue of a distended gallbladder or calcification within gallbladder (porcelain gallbladder).
2. *Oral cholecystography*—Of value in visualisation of radiotranslucent gallstones, and assessment of gallbladder function. If serum bilirubin is 2 mg./100 ml. the ingested dye

will not concentrate in the gallbladder. In absence of jaundice failure of gallbladder to opacify usually indicates obstruction of cystic duct. Occasionally filling defects caused by small stones are visible only after a fatty meal to make the gallbladder contract.
3. *IV cholecystography*—is primarily used to visualise the bile ducts when oral test has failed.
4. *Ultrasound*—Echoes within the gallbladder may permit presumptive diagnosis of gallstones. Advantages are: it is non-invasive, is useful in patients with non-visualisation of gallbladder on oral cholecystography and it gives results even in jaundiced patients.

MANAGEMENT:

1. *Surgical*—Cholecystectomy if stones are symptomatic.
2. *Medical*—Oral chenodeoxycholic acid (CDC) effective for dissolving cholesterol rich gallstones. Dose 15 mg/kg body weight/day. Oral cholecystogram should be repeated every 6 months to minitor response.

## 21. ACUTE PANCREATITIS

**Etiology:** (1) Gallstones. (2) Excessive consumption of alcohol. (3) Miscellaneous—(a) Carcinoma of pancreas or ampulla obstructing pancreatic ducts. (b) Viruses such as mumps or Coxsackie B directly damaging exocrine pancreatic cells. (d) Blood disorders such as hyperlipoprotenemia and hypercalcemia. (e) Drugs such as steroids and immunosuppressive agents. (f) Trauma from surgical operation on upper abdomen or accidental abdominal injury usually of crush type.

**Clinical features:**

1. *Abdominal pain*—gradual or rapid in onset. Starts in upper abdomen and may encircle the abdomen to the back, varying in intensity from relatively mild to severe. Often begins a few hours after a heavy meal or alcoholic intake.
2 *Vomiting*—at first usually of stomach contents, and as it is repeated, patient may bring up small amounts of gastric juices, mucus and perhaps some regurgitated bile, or there may be just severe retching.
3. *General condition*—may remain normal or in a severe case patient is very ill with rapid shallow respiration, sweating, prostration and hypovolemic shock.

*fructose, sorbitol, ethanol, methanol, severe liver disease.* (c) Other conditions—Uremia, salicylate poisoning.

(2) *With normal anion gap*—(a) GI bicarbonate loss—diarrhoea, intestinal, pancreatic and biliary fistulae. (b) Renal tubular acidosis. (c) Ingestion or infusion of acidifying salts e g. ammonium chloride, certain amino-acids. (d) Rapid IV hydration (dilutional acidosis).

**Metabolic alkaloses:**

1 *Excessive ingestion or infusion of alkali*—Milk alkali syndrome, alkali ingestion in presence of renal failure, forced alkaline diuresis, excessive bicarbonate therapy of metabolic acidosis.

2 *Inappropriate loss of acid*—pyloric stenosis, potassium or chloride depletion, hyperaldosteronism (renal losses)

3. *Contraction alkalosis*—rapid diuresis.

**Respiratory acid-base disturbances:**

**Respiratory acidoses:**

1. *Lung disorders*—Chronic obstructive airways disease, large airway obstruction, severe asthma (uncommon).
2. *Neuromuscular and skeletal abnormalities*—acute infective polyneuritis, polio, myathenia, motor neurone disease, severe obesity, kyphoscoliosis, etc
3. *Respiratory centre disorders*—Drugs e g. opiates, barbiturates, benzodiazepines, organic disease affecting respiratory control.

**Respiratory alkaloses:**

1. *Psychogenic hyperventilation.*

2 *Reflex hyperventilation* in pulmonary disease or pulmonary embolism.

3 *Other stimuli to respiratory centre*—(a)Via chemoreceptors —low inspired $O_2$ concentration, alveolocapillary diffusion block, right to left shunt, carbon monoxide poisoning. (b) Via drugs or metabolites—salicylate poisoning, hepatic encephalopathy. (c) *After recovery from metabolic acidosis* (d) Local lesion affecting respiratory centre.

**Clinical, metabolic and physiological effects:**

*Respiratory system*—Metabolic acidosis produces immediate hyperventilation In respiratory acidosis due to lung disease, the respiratory centre is depressed by prolonged hypercapnia and the respiratory response to progressive increments of $PaCO_2$ is

11. Colitis secondary to toxic drugs: Broad spectrum antibiotics such as tetracyclines.
12. Functional colonopathies: Prolonged use of laxatives, mucous colitis.

**III. Pancreatic disease—**

Malignant neoplasm, pancreatic insufficiency, chronic pancreatitis, islet cell tumour.

**IV. Gall bladder and biliary tract diseases—**

Fistula between biliary and intestinal tracts, concomitant achlorhydria.

**V. Reflex—**

Extracolonic disease: Pelvic inflammatory, urinary tract or appendicular disease.

**VI. Constitutional disorders—**

Gastrointestinal allergy, hyperthyroidism, diarrhoea of diabetes, uremia, collagen disease, sarcoid, pulmonary tuberculosis, Addison's disease.

**VII. Organic neurological disease—**

Tabes, intracranial disease, ganglioneuroblastoma.

**Differential Diagnosis:**

I. **History, Symptoms and Signs—**

1. HISTORY—(a) *Age*—Early life—parasitic, dysentery, chronic ulcerative colitis, abdominal tuberculosis, and idiopathic steatorrhoea. Middle life—colonic carcinoma, diverticulitis, pancreatic disease, abuse of purgatives. (b) *Sex*—Women—Colonic neurosis, hyperthyroidism, purgatives and diverticulitis, Men—Colonic carcinoma. (c) History of allergic disease.
2. SYMPTOMS—
   (a) *Types of diarrhoea:*
      (i) Exacerbation by states of anxiety, etc. Soon after meals (lienteric). An extremely urgent desire to defaecate in the mornings common in steatorrhoea.
      (ii) Constipation alternating with diarrhoea—Carcinoma of colon, diverticulosis, irritable bowel syndrome, laxative habits, intestinal tuberculosis.
      (iii) Relation to ingestion of food—if of gastric origin, diarrhoea usually in morning and immediately after each meal. Diarrhoea repeated after certain

kalaemia may be exacerbated and cardiac arrhythmias or arrest may result. Chronic therapy with alkalis may be required in some conditions associated with metabolic acidosis.

4. *Metabolic and respiratory alkalosis*—Seldom require attempts at acidification. Most metabolic alkalosis is due to potassium and chloride deficiency and adequate replacement of these is effective. However if tetany occurs or effects on cerebral circulation suspected, oral ammonium chloride or IV arginine hydrochloride infusion is required.

## 8. CUTANEOUS MANIFESTATIONS OF SYSTEMIC DISEASE

1. **Alimentary system—**
   - (a) *Liver diseases*—Pruritus associated with jaundice. hemorrhagic manifestations due to abnormal bleeding Pigmentation in hemochromatosis, longstanding biliary obstruction and primary biliary cirrhosis. Palmar erythema and arterial spiders and 'paper-money' skin in parenchymatous liver disease. Alopecia in cirrhosis. Xanthomata in patients with biliary obstruction Hirsutes and male distribution of body hair, acne and purplish striae suggesting excess adrenocortical activity in lupoid hepatitis. Nail changes such as clubbing, leuconychia and flat nails may occur in cirrhosis.
   - (b) *Pancreatic disease*—(i) *Acute pancreatitis*—Skin discolouration in left loin (Grey Turner's sign) or periumbilical region (Cullen's sign), occasionally with other intra-abdominal emergencies. (ii) *Carcinoma of Pancreas*—Recurrent subcutaneous nodules, abscess with erythema of overlying skin (metastatic fat necrosis) in patients with carcinoma of pancreas and pancreatitis Xanthomata due to hyperlipemia.
   - (c) *Malabsorption syndrome*—Pigmentation usually generalised, hemorrhages due to vitamin K deficiency, eczematisation due to hypocalcemia, angular chelitis or pellagrous rash from B complex deficiency, phrynoderma due to hypovitaminosis A. Hair brittle and lustreless. Koilonychia from iron deficiency and leuconychia associated with hypoalbuminemia Monilial paronychia may occur with hypocalcemia.
   - (d) *Ulcerative colitis*—Purpura, nonspecific eruptions such as erythematous rashes, pustules, urticaria and

IV. **Proctosigmoidoscopy**—For idiopathic ulcerative colitis, amoebic colitis, malignant lesions. In many cases of mucous colitis the membrane of the upper rectum possesses a peculiar lustrous appearance. Red velvety mucous membrane bleeding easily with minimal trauma in idiopathic steatorrhoea. If chronic diarrhoea occurs with mucous or blood and pus and no lesion can be detected, possibilities are (i) malignant lesion higher up in the colon, (ii) segment ulcerative colitis, (iii) regional enteritis, (iv) tuberculous ileocolitis.

V **Roentgenoscopic examination**—

1. *Plain film of abdomen*—when partial obstruction is suspected or abdominal distension is present. Calcifications may be seen in gall-stones, renal calculi or pancreatic disease.
2. *Barium enema*—to diagnose ulcerative colitis, carcinoma and diverticulitis, ileo-caecal tuberculosis and regional ileitis.
3. *Barium meal*—to diagnose tuberculous enteritis, mal-absorption syndromes, non-specific regional enteritis, bowel obstruction, surgical anastomosis. Rapid transit rate in emotional diarrhoea, hyperthyroidism, diabetic diarrhoea and uremia. Helminths particularly ascaris may be visualised Some of the collagen disorders may be suspected from findings on small intestinal X-rays
4. *Chest film*—of help when tuberculosis, malignant disease, lymphoma, collagen disease or sarcoid is suspected.
5. *Aortography*—to establish diagnosis of intestinal ischemia.

VI. **Other aids**—

1. *Small bowel biopsy*—useful in diagnosis of malabsorption syndromes, regional enteritis, collagen diseases.
2. *Skin and muscle biopsy*—collagen diseases
3. *Bone marrow biopsy*—blood dyscrasias, lymphomas, etc.
4. *Liver biopsy*—hepatitis, cirrhosis, sarcoid.
5. *Gastric analysis.*
6. *Liver and pancreatic function tests.*
7. *Tests for malabsorption.*
8. *Specific studies*—to rule out renal disease, diabetes and endocrinal disorders.

## 23. MALABSORPTION SYNDROMES

**Definition:** The malabsorption syndrome comprises a large number of pathological conditions which interfere in various ways with the absorption of fat and other substances. Defective

Sulphonylureas, tetracyclines, chlorothiazide, phenothiazines, nalidixic acid. (k) *Pigmentation*—Antimalarials, oral contraceptives, chlorpromazine, arsenic, busulphan. (1) *SLE-like syndrome*—Procainamide, hydralazine, hydantoins, sulphonamides. (m) *Ichthyosis*—Nicotinic acid, triparanol. (n) *Acrodynia*—Mercurials. (o) *Exacerbation of pre-existing skin disease*—(i) Porphyria—Sulphonamides, barbiturates, chloroquine, oestrogens, griseofulvin. (ii) Psoriasis—Choloroquine.

7. **Metabolic diseases**—(a) *Hemochromatosis*—Generalised and diffuse bronze pigmentation especially on exposed parts (b) *Porphyria*—Triad of lesions on exposed parts—oedema, erythema and vesiculation. Bulla formation may occur during stage of erythema due to trauma or heat. (c) *Glycogen storage disease*—Xanthomata. (d) *Familial hyperlipemia*—Xanthoma on extensor surfaces of limbs, buttocks, and sometimes ears and eyelids. (e) *Primary amyloidosis*—Hemorrhages and infiltrations, successive crops of purpura affect sides of nose, circumoral region, sides of neck, and perineum (f) *Protein anomalies*—(i) Macroglobulinemia—Cutaneous hemorrhages, or indolent skin ulceration of legs and arms. (ii) Cryoglobulinemia—Skin changes include Raynaud's phenomenon, cold-precipitated urticaria, cutis marmorata, and cutaneous infarcts with gangrene. (g) *Hurler's syndrome*—Symmetrical 'peau d'orange' appearance on upper part of back, upper arms, forearms, pectoral regions and lateral aspects of thighs. (h) *Gaucher's disease*—in adults. Pigmentation of exposed parts. Hemorrhagic diathesis common.

8. **Reticulo-endothelial disorders**—(a) *Polycythemia vera*—Rubor of skin, ecchymoses common, rarely purpura. (b) *Multiple myeloma*—(i) Nonspecific manifestations—due to abnormal plasma proteins—include cutaneous amyloid deposits, pallor due to anemia, pyoderma and mucosal ulceration due to neutropenia, and purpura due to thrombocytopenia, (ii) Specific lesions rare—extramedullary plasmocytomas of skin and mucous membranes (c) *Reticuloses*—(i) Nonspecific—Pallor, pruritus, urticaria, prurigo-like papules, pigmentation, jaundice, purpura, herpes zoster, bullous lesions, poikilodermatomyositis. (ii) Specific—Icthyosiform atrophy (in Hodgkin's disease), ulcers and nodules, tumors and plaques. (d) *Sarcoidosis*—Erythema nodosum commonest. Annular or circinate eruptions may occur Development of maculo-papular eruption often

5. OSMOTIC PURGE—Disaccharidase deficiency causing sugar diarrhoea.
6. OF UNKNOWN ETIOLOGY—Hyperthyroidism, diabetes mellitus.

**Clinical Features:** Common clinical presentations in the adult are:

1. Diarrhoea and/or abdominal discomfort.
2. Nutritional deficiencies (See table).
3. General features such as weight loss, tiredness and breathlessness.

| | | |
|---|---|---|
| | Fat | Steatorrhoea, weight loss |
| | Carbohydrates | Flatulent dyspepsia, abdominal distension |
| | Protein | Wasting, oedema |
| Water-Soluble Vitamins | Folic acid | Macrocytic, megaloblastic anaemia; glossitis |
| | Vitamin $B_{12}$ | Macrocytic, megaloblastic anaemia; glossitis, mental and neurological disturbances. |
| | Vitamin B complex | Cheilosis, angular stomatitis, dermatitis, polyneuritis |
| | Vitamin C | Bleeding tendency |
| Fat-Soluble Vitamins | Vitamin A | Follicular hyperkeratosis, xerophthalmia |
| | Vitamin D & calcium | Osteomalacia, tetany |
| | Vitamin K | Purpura, haemorrhages |
| | Iron | Hypochromia |
| | Sodium | Muscular weakness, cramps |
| | Potassium | Flaccidity, arrhythmias |
| | Magnesium | Muscular weakness |
| | Water | Nocturnal diuresis |

**Diagnosis:**

A. BIOCHEMICAL—

1. *Stool examination*—(a) Naked eye inspection—Steatorrhoeic stool is pale white and bulky, and has a characteristic rancid odour. (b) Weight—Normal daily weight of stools

2. *Tuberculosis*—(i) Usually children. (ii) *Adenopathy local* or general including mediastinal and retro-peritoneal. (iii) Glands matted together and often caseous; may be tender. (iv) Fever always present (v) No splenomegaly. (vi) Often tuberculosis elsewhere.
3. *Infectious mononucleosis*—(i) Children or young adults. (ii) Adenitis mostly cervical, may be generalised. (iii) Glands discrete, moderately enlarged, slightly tender. (iv) Moderate fever. (v) Splenomegaly. (vi) Acute onset, chills and sore throat (vii) Leucocytosis with predominant small lymphocytes. (viii) Positive Paul-Bunnel test. (ix) Recovery in a few weeks.
4. *Syphilis*—(i) Usually young adults. (ii) Posterior cervical and epitrochlear glands always enlarged. Enlargement slight (iii) Hard, painless, discrete. (iv) Fever variable. (v) Splenomegaly sometimes. (vi) Skin rash, mucous patches, joint pains, or other evidence of secondary syphilis. (vii) Positive VDRL test. (viii) Spontaneous recovery common
5. *Lymphogranuloma inguinale*—(i) Initial lesion on genitalia small and usually herpetiform. (ii) General disturbances with fever, headache, joint pains, conjunctivitis, rashes. (iii) Inguinal bubo, painless and developing slowly over a period of weeks or months Finally the lymph nodes fuse and soften into a cold abscess which bursts with formation of tiny fistulas. (iv) Frei's test positive in 95% cases (v) Rarely suppuration of cervical glands in primary lesions of mouth, and of axillary glands in infections of finger.
6. *Systemic lupus erythematous*—(i) Acute onset (ii) Generalised lymphadenopathy. (iii) Recurrent septic type of fever. (iv) Flushed or erysipelas-like appearance of face. (v) Erythematous lesions on trunk and extremities, ulcers and erosions of mouth. (vi) Splenomegaly. (vii) Arthritic pain (viii) Cardiac manifestations. (ix) Purpura. (x) L.E. cell—characteristic cell found in bone marrow. Sometimes in circulating blood and mesenchymal tissue. It is a polymorphonuclear neutrophil with one or more large inclusion bodies which stain reddish violet with Wright's stain.
7. *Leishmaniasis*—Rarely the disease may be localized in the lymph nodes History of the patient having been in area of endemic leishmaniasis. Presence of L. D. bodies can be demonstrated in the gland.
8. *Tularemia*—Local lesion may be an infected wound or papule After an incubation period of 1-10 days, chill and headache are followed by fever, bodyache, and enlargement of regional lymph-nodes, which may proceed to a chronic indolent abscess.

in the preparation of bread, chappatis, macroni, soups, sauces, pastries to be excluded. All canned products not allowed.

2. *Digestants*—Pancreatic enzyme preparations after meals.
3. *Treatment of anaemia*—All the three hematinics vitamin $B_{12}$, tolic acid and iron should be given.
4. *Vitamin supplements*—Vitamin B complex. Large doses of Vitamin D and calcium if osteomalacia.
5. *Steroids*—Prolonged therapy with prednisolone if no satisfactory response to gluten-free diet. Longer the course of therapy, better the results. May be used as temporary measure in patients who are severely ill at beginning of treatment.

## 24. ABDOMINAL TUBERCULOSIS

**Clinical types:**

A. TUBERCULOSIS OF PERITONEUM—

(1) *Ascitic type*—(a) Acute. (b) Subacute or chronic.

(2) *Caseous or loculated type.*

(3) *Fibroid type*—(a) Rolled up omentum. (b) Palpable intestinal coils. (c) Adhesions between coils with perforations into adherent coil or formation of localised abscesses. (d) Fistulae usually at umbilicus. (e) Chronic intestinal obstruction.

(4) *Miliary tuberculosis*—with ill-health, toxemia and vague abdominal discomfort.

B. TUBERCULOSIS OF MESENTERIC LYMPH NODES (Tabes mesenterica)—(1) Chronic tuberculous mesenteric lymphadenitis with or without intestinal tuberculosis. (2) Acute caseous tuberculous lymphadenitis causing tuberculous peritonitis. (3) Peritoneal adhesions to tuberculous lymph nodes causing intestinal obstruction.

C. TUBERCULOSIS OF INTESTINES—(1) *Ileum*—(a) Tuberculous ulcerations. (b) Tuberculous strictures with intestinal obstruction. (c) Perforation of tuberculous ulcer. (d) Acute miliary tuberculosis. (2) *Ileocecal region*—Hypertrophic ileocecal tuberculosis. (3) *Appendix*—Intermittent lower right quadrant abdominal pain. (4) *Stomach, jejunum, colon and rectum*—may rarely be affected.

D. TUBERCULOSIS OF LIVER—The liver may be involved in miliary tuberculosis due to hematogenous spread. Rarely pyrexia, jaundice and hepatomegaly due to more massive hepatic enlargement.

5. *Lymphangiography*—of value in diagnosing site, extent, and, in certain cases, even the nature of primary lymph node enlargement.
6. *Response to radiation*—in Hodgkin's disease and diffuse histiocytic lymphoma.

## 10. ARTHRITIS

**Classification of Causes:**

1. *Rheumatoid arthritis*—and its variants such as arthritis with psoriasis, juevenile rheumatoid arthritis. Felty's syndrome, rheumatic spondylitis, Reiter's syndrome.
2. *Arthritis due to rheumatic fever.*
3. *Degenerative joint disease* (Osteoarthritis).
4. *Arthritis associated with known infectious agents*—e.g. gonococcal, tuberculous, syphilitic, pneumococcal, etc.
5. *Associated with metabolic or biochemical or endocrine abnormalities*—Gout, hemoglobinopathies, ochronosis, acromegaly, etc.
6. *Traumatic arthritis.*
7. *Neuropathic arthritis.*
8. *Allergy and drug reactions.*
9. *Arthritis with blood disorders.*
10. *Connective tissue diseases*—Systemic lupus erythematosus, polyarteritis nodosa, dermatomyositis.
11. *Miscellaneous disorders*—Amyloidosis, erythema multiforme, ulcerative colitis, sarcoidosis.

### (1) Rheumatoid Arthritis

**Definition**—Rheumatoid arthritis is a systemic connective tissue disorder which affects predominantly the synovial joints, hence the term 'rheumatoid disease'.

**Etiology and pathogenesis**—(1) *Age*—any, majority between 20-45 with peak at 35-40 years. (2) *Sex*—more in females 3:1. (3) *Climate*—Disease of temperate climates with low incidence in tropics. (4) *Family history*—Patients, particularly those with a family history of the disease, have increased frequency of HLA antigen DR4. In addition, those having DR3 antigen may have more severe disease. (5) *Psychological factors*—Preceding physical or emotional shock common. (6) *Exposure to cold and wet.* (7) *Trauma*—arthritis may start in a joint which has been the seat of trauma, and other joints subsequently get involved. (8) *Cause*—of RA is unknown. However it is thought that, particularly in genetically predisposed individuals, some environmental

bowel habit. (iii) Temperature becomes irregular without change in lung lesion. (iv) Sudden reversal of previously satisfactory clinical course of pulmonary T.B. not explained by condition of lung lesion, or unsatisfactory clinical course in spite of adequate treatment.

2. *Radiological*—Suggestive features on barium meal examination—(i) Lack of barium retention in diseased segment of ileum and/or cecum (Stierlin's sign). (ii) Persistent narrow stream of barium in small bowel (String sign). (iii) Areas of small bowel obstruction manifested by delay dilatation and delay in emptying in association with short segments of irregularity of bowel silhouette and mucosal markings. (iv) Single filling defects in cecum in hypertrophic tuberculosis. (v) Broad-based triangular appearance of terminal inch of ileum with base towards cecum (Fleischern's sign).

3. *Animal inoculation*—or culture of suspected tissue with resultant growth of tubercle bacilli.

4. *Histological*—demonstration of mycobacterium tuberculosis or histologic evidence of tubercles with caseation necrosis.

**Primary tuberculous enteritis (Hypertrophic type) :**

Clinical features—Symptoms similar to secondary variety except for absence of pulmonary complaints. Usual presenting picture of tuberculoma is that of intestinal obstruction with pain as the chief complaint. Weight loss, anorexia, borborygmi, fever, nausea, vomiting and weakness. Diarrhoea in about one-third of cases Tumour palpable in ileocecal region in more than 50 per cent, most often fixed and simulating malignant lesion in consistency but usually tender.

Management :

1. Diet—Bland, low in residue. Low fat diet if steatorrhoea.
2. Anti-tuberculous drugs.
3. Fat soluble vitamins, Vitamin C and calcium
4. Pancreatin 1-4 gm. after each meal if very poor absorption.
5. Surgical treatment—Indications—(a) localised tuberculous involvement of hyperplastic type with marked diminution of lumen caliber, (b) stenosis of bowel causing obstruction, (c) perforation of tuberculous ulcer.

## 25. DIVERTICULITIS COLI

**Etiology :**

*Age*—Usually 55 to 65. *Sex*—More in females. *Causation*—A diverticulum of the colon is a herniation of the bowel mucosa

**Investigations:**

(1) *Serum amylase*—levels > 1000 IU per litre diagnostic. (2) *Urinary amylase*—If patient presents late. Amylase in urine > 3000 IU. (3) *Ultrasonography*—shows enlargement of pancreas in majority. (4) *Radiology*—Presence of sentinel loop—dilated loop of bowel overlying pancreas confirms diagnosis of acute inflammation.

**Treatment:**

1. *Relief of pain*—Inj. Pethidine 50-100 mg.
2. *Suppression of pancreatic secretion*—(a) Nothing by mouth except sips of water. (b) Aspiration of stomach contents through nasogastric tube. (c) Drugs such as aprotonin (trasylol) of doubtful value.
3. *Treatment of shock*—IV fluids with CVP line. IV calcium gluconate. IV plasma may be necessary.

## 22. CHRONIC DIARRHOEA

**Causes:**

**I. Gastrogenous—**

1. Anacidity or hypochlorhydria—Gastritis, primary macrocytic anaemia, neoplasm, idiopathic, specific infections (syphilis, tuberculosis, etc.).
2. Following gastric surgery—Gastrectomy, gastro-enterostomy, vagotomy.

**II. Disease of the intestines—**

1. Chronic enteric infections—Bacillary dysentery, bacterial agents like salmonella, streptococci, fungi, viral infections, actinomycosis.
2. Parasitic causes—Protozoa—amoebic colitis, flagellates (giardia lamblia), Infusoria (E. Coli), Leishmania donovani. Helminths—Strongyloides stercoralis, Trichinella spiralis.
3. Absorption defects—Primary and secondary malabsorption syndromes.
4. Postoperative—Enterectomy, entero-colostomy.
5. Internal fistulae—biliary, gastric, enteric.
6. Deficiency states—e g , pellagra.
7. Intestinal carbohydrate dyspepsia.
8. Common ulcerative diseases: Ulcerative colitis, tuberculosis of the intestines, regional enteritis.
9. Other intestinal diseases: Carcinoid tumour, diverticulitis.
10. Chronic intestinal ischemia (Mesenteric artery insufficiency).

2. *Chemotherapy*—Crystalline penicillin 1 mega units 6-hourly and Streptomycin 1 gm. once a day IM, Ampicillin 250-500 mg. q.d s.
3. *Anticholinergic drugs*—taken regularly by mouth may alleviate colonic spasm and relieve symptoms.
4. *Surgery*—Excision of affected bowel and end-to-end anastomosis. Sigmoid myotomy is indicated for localised muscle hypertrophy. Indications—Perforation with general peritonitis, localised abscess or bowel obstruction.

**II. Diffuse diverticulosis—**

*Symptoms*—Sluggish bowel habit. Patient usually in poor physical health. May present with a perforation or massive haemorrhage especially hypertensive.

*Management*—(a) Bran diet. (b) For perforation immediate laparotomy, and oversewing of perforation. If perforation not visible, exteriorisation or proximal colostomy and drainage. For haemorrhage conservative treatment; if surgical intervention becomes necessary total colectomy.

## 26. INFLAMMATORY BOWEL DISEASE

### ULCERATIVE COLITIS

**Definition:** An inflammatory disease of unknown origin characterised clinically by recurrent attacks of bloody diarrhoea, and pathologically by a diffuse inflammation of the colonic mucosa.

**Etiology:** *Age*—more common between 20 to 40. *Sex*—slightly more in females. *Cause*—unknown. Possible factors: (a) *Genetic*—Increased incidence in some families. (b) *Infection*—Specific pathogenic bacteria have not been isolated. Presence of a transmissible agent, possibly a small RNA virus is suggested. (c) *Immunological*—responses to dietary, bacterial and colonic antigens occur. Lymphocytes from these patients are cytotoxic to colonic epithelial cells and there is complement activation by antigen and antibody reactions. (d) *Psychological factors*—may influence the course of the disease but may not cause it.

**Clinical features:**

Symptoms: (1) Onset often insidious with diarrhoea and simultaneous or subsequent passage of blood and mucus mixed with the stool. Patients with proctitis and distal disease may present with constipation and rectal bleeding. (2) Left-sided abdominal pain relieved by defaecation, and tenesmus common.

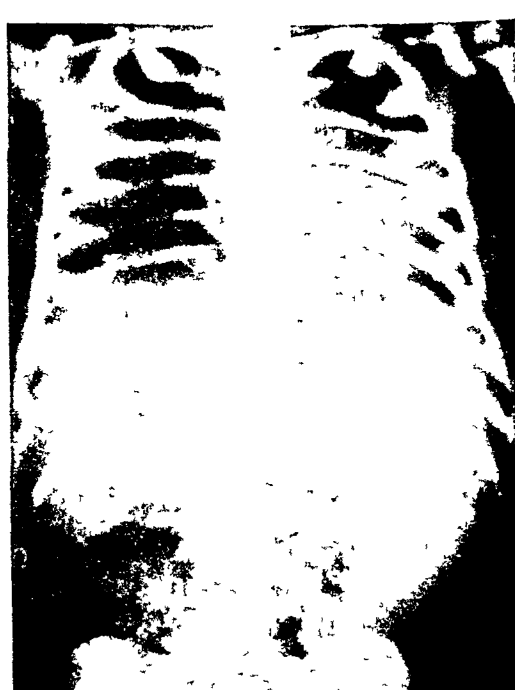


Osteoporosis Lateral thoracic spine film showing wedged, compressed and biconcave (cod fish mouth) vertebrae



Osteoporosis The condition associated may be menopausal state in females, disuse atrophy, old age, malnutrition, hyperthyroidism, Cushing's syndrome, steroid therapy, acromegaly or idiopathic osteoporosis





Osteopetrosis involving the whole skeleton Note the calcification of the interosseous membrane (left), shadow of the large spleen (right)

| | Ulcerative colitis | Crohn's disease |
|---|---|---|
| *Histology* | | |
| Distribution | Mucosal | Transmural |
| Cellular infiltrate | Polymorphs, plasma cells, eosinophils | Lymphocytes, macrophages |
| Glands | Destroyed | Preserved |

## Management:

### Medical

1. *General measures*:
   (a) *Bed rest.*
   (b) *Correction of dehydration and electrolyte losses*—IV infusions of saline or dextrose with added potassium.
   (c) *Correction of anaemia*—by blood transfusion which should be repeated as necessary to maintain hemoglobin at normal values. Iron therapy useless during acute attacks.
   (d) *Diet*—During initial stage nothing except water by mouth. Later high roughage diet.
2. *Corticosteroids*—(a) *Systemic*—(i) Hydrocortisone succinate sodium 100 mg. b.d. or t d.s. by IV drip for 5 days. After this prednisolone by mouth. (ii) ACTH—40 U of gel IM b.d. is more effective in aborting severe attacks.
   (b) *Local*—(i) Rectal drip of 100 mg. hydrocortisone succinate sodium in about 120 ml. normal saline b d. Avoidance of food in initial stages helps to retain rectal drip. (ii) Rectal suppository—when disease is confined to distal rectum suppositories containing prednisolone-21-phosphate once or twice daily.
3. *Sulphasalazine* (Salazopyrin)—may suppress acute attack but more effective in preventing subsequent relapses. Initial dose 1 gm. qds reduced to 0.5 gm. qds for maintenance therapy. Nausea, vomiting, headaches, sensitivity rashes and blood dyscrasias are known side effects.
4. *Azathioprine*—can be useful in maintaining remission. Should be used only in those not responding to conventional treatment.
5. *Sodium cromglycate*—has also been tried.
6. *Antibiotics*—should be avoided unless bacterial infection is proved.

**Investigations:**

1. *Radiology*—Barium meal shows "string sign"—a thin irregular shadow extending from last filled loop of ileum through area of filling defect to ileocaecal valve. Normal segments in between diseased segments—"skip lesions".
2. *Sigmoidoscopy and rectal biopsy*—Histological features in colonic disease will help differentiation from ulcerative colitis.

**Treatment:**

I. MEDICAL—Unsatisfactory. Indications—(a) Acute ileitis. (b) Granulomatous jejunocolitis or ileo colitis. (c) Localised disease of short duration without complications. (d) Long standing cases but without tendency to progress (e) Refusal of operation.

1. *General measures*—High protein, low fat, high caloric diet with minimal roughage. Vitamin supplements. Rest in bed during acute phase with liquid diet. If anaemia iron by injection, or $B_{12}$ and folic acid if megaloblastic anaemia. Codein sulphate 30 mg. t d.s. helps to reduce bowel looseness.
2. *Corticosteroids*—Prednisolone 10 mg. q.d s may induce temporary remission during acute phase, maintenance therapy with 10-15 mg. daily may be continued. Of value also in those patients with recurrent disease after surgery.
3. *Anibiotics*—useful during acute exacerbations.

II. SURGICAL—Indications—(a) Intestinal obstruction. (b) Perforation. (c) Massive intestinal haemorrhage. (d) Persistence of constitutional symptoms in spite of adequate medical treatment. Ileo-transverse colostomy with resection of diseased ileum operation of choice.

SMALL PRINT

**Alimentary hormones**

| *Hormone* | *Physiological role* |
|---|---|
| Gastrin .. | Stimulates acid, maintains mucosal growth, causes gastric motor activity. |
| Secretin | Stimulates pancreatic bicarbonate. |
| Cholecystokinin | Stimulates GB contraction and pancreatic enzyme secretion |
| Motilin . . | Causes upper alimentary motor activity |
| Glucose-dependent insulin-releasing hormone .. | Stimulates insulin release |
| Neurotensin | Unknown |
| Enteroglucagon . . | Maintains mucosal growth Slows intestinal transit |
| Pancreatic polypeptide . . | Inhibits GB contraction and pancreatic enzyme release. |

2. *Subcutaneous nodules*—occur in 20-30% of cases. Vary between 3-20 mm in diameter, single or multiple, occurring over bony prominences, at sites of pressure or friction e.g. elbow. Their presence indicates an adverse prognosis.
3. *Muscle wasting and weakness*—common. Inflammatory myositis and steroid myopathy may occur.
4. *Bone*—Generalised osteoporosis especially of vertebral bodies. Spontaneous vertebral collapse and wedging may occur.
5. *Eyes*—(a) Keratoconjunctivitis sicca—most common eye lesion. Secondary conjunctivitis and corneal ulceration may occur. (b) Scleritis It can spread to cause uveitis or keratolysis.
6. *CVS*—(a) Pericarditis commonest (b) Myocarditis uncommon, can cause cardiomyopathy. (c) Rheumatoid valvulitis —usually aortic incompetence. (d) Vasculitis—(i) Small nail-fold and nail-edge infarcts, or sometimes gangrene of the digits. (ii) Purpuric rashes caused by capillaritis. (iii) Indolent leg ulcers due to small vessel vasculitis.
7. *Neuropathy*—due to involvement of vasa vasorum in the walls of the nerves
8. *Blood*—(a) Anemia—(i) Normochromic normocytic most frequent due to limited release of iron from reticuloendothelial cells for uptake by maturing erythrocytes. (ii) True iron-deficiency hypochromic anemia due to chronic blood loss from GI tract. (iii) Less common mechanisms are decreased erythrocyte survival with mild hemolysis, hemodilution, and macrocytosis due to low serum folate. (b) Leucopenia and thrombocytopenia due to hypersplenism, or drug-induced. (c) Eosinophilia may occur. (d) Others—Raised ESR and plasma viscosity with hyperfibrinogenemia, rarely hyperviscosity syndrome, and thrombocytosis in very active disease.
9. *RS*—(a) Pleurisy and pleural effusions—relatively common (b) Rheumatoid nodules—may be parenchymal or subpleural, solitary or multiple. May cavitate and cause hemoptysis In rheumatoid patients exposed to certain dusts e.g. coal miners, nodules are accompanied by massive fibrotic reactions (Caplan's syndrome). (c) Fibrosing alveolitis starts in lower lobes and gradually spreads upwards. (d)

# 2. The Circulatory System

## 1. THE PULSE

**Importance of clinical examination in diagnosis:**

I. **Rate**—No absolute normal. Varies in different individuals and in same individual under different circumstances. In the adult male at rest during waking stage, rate varies between 60-80 per minute and in adult female from 70-90 per minute. The pulse is slower during sleep. *Bradycardia* is pulse rate less than 60 per minute. *Tachycardia* is pulse rate more than 100 per minute.

*Pulse apex deficit*—The pulse rate corresponds to heart rate except in the presence of extrasystoles or atrial fibrillation, where some of the beats are not transmitted to the radial pulse so that the heart rate exceeds the pulse rate.

II. **Rhythm**—Normal pulse is regular in rhythm. For bedside diagnosis it is important to observe whether the rhythm is regular or irregular and whether the rate is unusually rapid or slow or normal.

**Causes of bradycardia:**

*Regular rhythm*

1. Sinus bradycardia
2. Complete heart block
3. Partial A-V block with fixed ratio of 2 : 1 or more
4. S-A block with ratio of 2 : 1 or more
5. Nodal rhythm (Junctional rhythm)

*Irregular rhythm*

1. Sinus bradycardia with sinus arrhythmia
2. Partial heart block with irregularly dropped beats
3. S-A block with irregularly dropped beats
4. Atrial fibrillation (over digitalised)
5. A-V dissociation (slow type)

(c) *Arthroscopy*—Arthroscopic appearances will not distinguish RA from various inflammatory seronegative arthritides. In acute RA synovium is oedematous, diffusely erythematous and friable. In more chronic conditions, it becomes thickened and polypoid.

(d) *Renal biopsy*—is indicated in case of reduced glomerular or tubular function.

(e) *Pulmonary biopsy*—to distinguish rheumatic nodules from carcinoma or to establish diagnosis of fibrosing alveolitis.

4 *Radiology—Early changes*—Soft-tissue swelling, periarticular osteoporosis, periostitis, erosions and narrowed joint space. *Later*—Marked irregularity of articular surfaces and severe erosions, joint subluxations, generalised osteoporosis and secondary degenerative changes.

**Rheumatoid variants:**

1. *Palindromic rheumatism*—Periodic monoarticular or polyarticular joint swelling, "recurring arthritis", attacks last from hours to days, clear spontaneously and leave no joint residuals. 30 to 40 per cent of these cases develop rheumatoid arthritis.

2. *Psoriatic arthropathy*—It runs a course very like that of rheumatoid arthritis but can be distinguished by the characteristic involvement of the terminal interphalangeal and sacroiliac joints SCAT negative and disease relatively mild. In exceptional cases marked destructive changes occur in the joints (arthritis mutilans).

3. *Juvenile rheumatoid arthritis* (Still's disease)—Acute form of rheumatoid arthritis occurring usually between ages of 2 and 4 years. Certain features are quite distinct from adult disease—more frequent occurrence of high fever, characteristic rash, splenomegally lymphadenopathy, chronic iridocyclitis, single-joint involvement, failure to grow, striking leucocytosis, and infrequency of subcutaneous nodules Negative rheumatoid factor.

4 *Intermittent hydrarthrosis*—A joint disorder most common in the knees, occurs at regular cyclic intervals. The synovitis is acute, lasts for 2 days to 4 weeks and clears without residuals. Many of these patients eventually develop typical signs of rheumatoid arthritis.

2. *Peripheral vasoconstriction*—Shock, hypovolemia.
3. *Mechanical obstruction*—Mitral stenosis, aortic stenosis, HOCM, coarctation of aorta.

IV. **Force**—Corresponds to systolic blood pressure Press the radial artery against the underlying bone with the more proximal of the two palpating fingers till the pulse wave is no longer felt with the distal finger. More the pressure required to obliterate the pulse higher the systolic blood pressure.

V. **Rate of rise or ascent of pulse**—Normal rate of rise of pulse signifies absence of significant obstruction to outflow at aortic valve. (i) *Rapidly rising pulse*—Light application of examining finger elicits a sharp tap or slap. Very rapid rate of rise with large pulse volume in aortic regurgitation, P.D.A, hyperthyroidism. (ii) *Slowly rising pulse*—in aortic stenosis.

VI. **Tension**—Gives an idea of the diastolic pressure When the tension is low, the artery is easily flattened and resumes its cylindrical shape without undue resistance The pulse of low tension appears to collapse between the beats so that nothing is felt at this time If the diastolic pressure is high, the artery is palpable both in systole and diastole.

VII. **Condition of arterial walls**—In arteriosclerosis the vessel is palpable and can be rolled between the fingers. The inelasticity of a rigid artery may cause a strong pulse to appear weak.

VIII. **Inequality of pulse**—Weakness of pulse at the wrist on one or other side may be due to an ectopic origin and aberrant course of the left subclavian artery, or may denote proximal compression as from aneurysm of aorta, mediastinal growth, cervical rib or scalenus anterior syndrome. Weakness or inequality or absence of pulse is also found in pulseless disease and peripheral embolism.

IX. **Radio-femoral delay**—In coarctation of aorta, the femoral pulse is delayed when compared to the radial and not synchronous as in normal subjects.

X. **Special types of pulse**—

1. SMALL WEAK PULSE—Often found in conditions with low stroke volume of left ventricle, narrow pulse pressure and increased peripheral resistance, e.g. left ventricular failure, diffuse myocardial disease, constrictive pericarditis, stenosis of mitral, pulmonary or tricuspid valve. A small, weak pulse at rapid rate (thready pulse) in states of shock.

(2) NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDs)—

| Drug | Dose | Remarks |
|---|---|---|
| *Salicylic acids* | | |
| Aspirin | 600-900 mg 6 times a day | Cheap and effective Produces gastric irritation. |
| Aloxiprin | 1200 mg q d s. | |
| Benorylate | 10 ml b d. | |
| Trilisate | 1-1 5 g b d. | |
| *Propionic acids* | | |
| Ibuprofen | 400-800 mg. q d s. | Best first drug. Lowest incidence of side-effects Higher doses can cause complications |
| Benoxaprofen | 600 mg o d. | |
| Fenoprofen | 600 mg o.d. | |
| Ketoprofen | 100 mg t d s | |
| Naproxen | 500 mg b.d. | |
| *Fenamic acids* | | |
| Flufenamic acid | 200 mg q d s | Useful but weaker alternatives. Diarrhoea only significant side effect |
| Mefanamic acid | 500 mg q.d.s | |
| *Enolic acids* | | |
| Pyrazolones | | |
| Oxyphen-butazone | 100 mg t d s | Should usually be avoided because of gastric irritation, fluid retention and bone marrow damage. |
| Phenylbutazone | 100 mg q d.s | |
| Azapropazone | 600 mg b d. | |
| Feprazone | 200 mg t d.s | |
| Oxicams | | |
| Piroxicam | 20 mg o d. | Toxicity similar to all NSAIDs Long half-life. |
| *Phenylactetic acids* | | |
| Diclofenac | 50 mg b d. or 100 mg slow release o d | Has lowest incidence of side-effects including rash. |
| Fenclofenac | 600 mg b d | May have penicillamine-like as well as anti-inflammatory action |
| *Cyclic acetic acids* | | |
| Indomethacin | 25 mg t d s or 75 mg nocte or suppository 100 mg nocte | Indomethacin effective for control of night pain and morning stiffness. Can cause peptic ulceration, headache, giddiness and depression, and fluid retention especially in elderly. |
| Sulindac | 200 mg b d. | |
| Tolmetin | 400 mg q d s | |

(3) LONG-ACTING DRUGS—*Indications*—(a) Persistently active disease in adults after 6 months of treatment with optimal anti-inflammatory therapy. (b) Progressive disease, either with developing deformities, restriction of joint motion or new erosions on radiographs. (c) Excessive requirements of corticosteroids. (d) Troublesome extra-articular features.

stenosis. May be found in patients with combined aortic regurgitation and stenosis, less often in pure A.I.

4. Pulsus parvus et tardus—Small pulse with a delayed systolic peak. Characteristic of moderate to severe valvular aortic stenosis. It may be possible to palpate an anacrotic notch on the upstroke of the (carotid) pulse.

5. Pulsus alternans—A strong and weak beat occur alternately. It results probably from alternate rather than regular contraction of the muscle fibres of the left ventricle, those which respond to one stimulus failing to respond to the next. It may be found in association with left ventricular failure or toxic myocarditis and is a sign of ill omen. In apparently normal persons, pulsus alternans may occur during paroxysmal tachycardia or for several beats following a premature beat.

6. Jerky pulse—refers to a combination of a small volume pulse and collapsing pulse. There is a rapid upstroke and a quick fall off in early systole. It may be found in hypertrophic obstructive cardiomyopathy, severe mitral regurgitation and in V.S.D.

7. Pulsus bigeminus ("coupling")—Recurrent grouping of the heart beats in pairs followed by a pause. Causes—(i) Extrasystoles. (ii) Atrio-ventricular block, every third sinus impulse being blocked. (iii) Sinoatrial block with ventricular escape. (iv) Block in atrial flutter alternating between 2 : 1, 3 : 1 or 4 : 1.

8. Pulsus paradoxus—In normal persons the systolic blood pressure may decline 3-10 mm. Hg. during inspiration Although inspiration increases venous return to the right side of the heart, there is relative pooling of blood in pulmonary vasculature as a result of lung expansion and more negative intrathoracic pressure during the active phase of respiration. The net result is a decrease in return of blood to L.A. and L.V. and subsequent fall in L.V. output and decrease in arterial pressure When the systolic blood pressure falls more than 10 mm. the pulse is referred to as pulsus paradoxus.

*Causes*—(i) Limitation of inspiratory increase in blood flow to R.V. and pulmonary artery e.g. superior vena cava obstructions. (ii) Greater than normal amount of inspiratory pooling of blood in pulmonary vasculature causes the intrathoracic pressure to have wide excursions of pressure during inspiration e.g. asthma, emphysema and airway obstruction; (iii) Interference with venous return to either atrium during inspiration e.g. pericardial effusion, constrictive pericarditis and patients with severe congestive cardiac failure with markedly raised venous pressure.

strable synovitis. (iii) If benefit from the drug is likely to exceed the risk of its administration. (iv) Economic and social obligations, preventing long-term inpatient conservative care. (v) To keep the maintenance dose at a minimum with help of other anti-inflammatory drugs as 'steroid sparers'. *Dose*—Initially 5 mg. of prednisolone daily, increasing to 7.5 mg. if necessary and exceptionally to 10 mg. Withdrawal of steroid therapy—Dose reduced by 0 5-1 mg. a week or every two weeks. The use of 30-minute synacthen test is helpful in dealing with patients who have taken high doses over long period. (Plasma cortisol level should rise by at least 7 mcg. in 30 minutes after 0.25 mg. soluble short-acting tetracosactrin). If the test indicates that the patient's adrenal glands can produce cortisol, it is worth while giving weekly injections of corticotrophin 40 mg. or tetracosactrin (synacthen) 0.5 mg, until steroid withdrawal is complete.

**III. Local treatment—**

(a) *Splinting*—In acute and subacute stages it is advisable to rest the joints in light plaster or plastic splints. (b) *Intra-articular injections*—Corticosteroids can be injected into acutely painful joints or tendon sheaths provided there is no evidence of infection. Dose—25-50 mg. of hydrocortisone diluted in 2 ml. saline with 1% lignocaine. For weight bearing joints repeated injections should be avoided because of the danger of aseptic necrosis or a Charcot-like joint (c) *Yttrium-90*—injection into knee joints with chronic synovitis may reduce inflammation and synovial swelling. It is at present confined to patients above age of 45 years, and a 48-hour immobilisation after the injection is necessary to prevent the radiochemical from spreading to regional lymph nodes (d) *Physiotherapy and occupational therapy*—as the inflammation subsides.

**IV Surgical treatment—**

(a) Prosthesis—Total hip-joint replacement successful. Results with knee-joint replacement less satisfactory. Silastic finger-joint prosthesis. (b) Surgical fusion—if atlanto-axial subluxation with evidence of cord compression. (c) Synovectomy—can produce subjective benefit for some years.

(2) **Rheumatic fever**—First attack under age of 15 in majority, transient flitting joint pains, prompt relief of pain and subsidence of temperature as a rule within 24 hours of salicylate therapy.

| *Drug* | *Uses in arrhythmias* | *Avg. daily dose* |
|---|---|---|
| CLASS III<br>*Drugs which prolong refractoriness*<br>Amiodarone | Ectopic beats.<br>A. Fl., A. Fib, vent tachy., vent. fib. | 200 mg |
| CLASS IV<br>*Calcium antagonists*<br>Verapamil | Supravent. tachy. | 160 mg |
| OTHER DRUGS<br>*Digitalis* | A. Fl. A Fib.<br>Arrhythmias of pre-excitation syn. | 250 mg |
| *Bretylium* | Intractable vent tachy. or vent fib. | Variable |

All drugs can be administered by both oral or parenteral routes except lignocaine.

**Sinus bradycardia:** Sinus rhythm slower than 60 beats per minute (Fig. 2.1)

*Causes*—(i) *Non-cardiac*—Athletes, elderly people, after viral infections, increased vagal tone (simple syncope), increased intracranial pressure. Drugs such as betareceptor blockers, digitalis, reserpine, lignocaine, tranquillisers. (ii) *Cardiac*—Myxoedema, acute cardiac infarction.

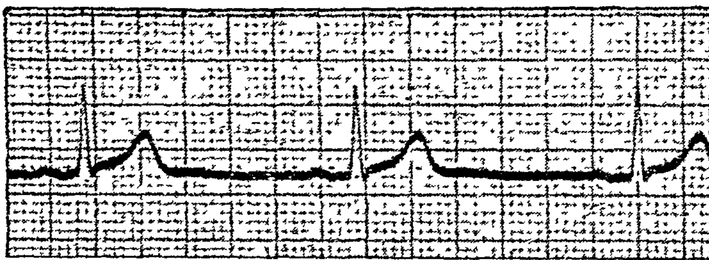


Fig. 2.1 Sinus bradycardia. Rate 50 per minute

**Sinus tachycardia:** Sinus rhythm faster than 100 beats per minute. (Fig. 2.2).

*Causes*—(i) *Non-cardiac*—Anxiety state, anaemia, fever, pregnancy, alcoholism acute or chronic, carcinomatosis. Drugs such as adrenaline, thyroxine, isoprenaline, atropine and its analogues. (ii) *Cardiac*—Acute carditis, untreated heart failure, acute cardiac infarction.

rheumatoid arthritis. Common organisms are staphylococcus, pneumococcus, streptococcus, Ps. pyocyanea, E. coli Monoarticular arthritis. Joint swollen, red and hot and held immobile. Leucocytosis. Aspiration reveals purulent fluid.

(b) *Gonococcal arthritis*—Usually affects one joint. Signs similar to septic arthritis. Milder atypical form may occur.

(c) *Tuberculous arthritis*—(i) Common in children. (ii) Slow insidious development. (iii) Usually monoarticular, rarely polyarticular. (iv) History of pleurisy, cervical adenitis or fistula-in-ano, or associated visceral tuberculous lesions; history of trauma in about half. (v) Muscle wasting early and marked, pain and tenderness late symptoms. (vi) Slight or no fever. (vii) Thickened synovial membrane (doughy feel of the joint). (viii) Tendency to formation of cold abscesses within the joint, and sinuses. (ix) X-ray—decalcification of bone, and soft tissue swelling. later marginal erosion with irregularities of contour along the joint surfaces and marked haziness of the joints.

(d) *Syphilitic arthritis*—

*Congenital syphilis*—(i) Parrot's syphilitic osteochondritis (ii) Clutton's joints. (iii) Less common forms—gummatous synovitis, syphilitic dactylitis, suppurative joint disease.

*Secondary acquired syphilis*—(i) Arthralgia (ii) Synovitis (iii) Hydrarthrosis. (iv) Bursitis. (v) Arthritis resembling rheumatic fever. (vi) Arthritis resembling rheumatoid arthritis

*Tertiary acquired syphilis*—(i) Gummatous arthritis. (ii) Charcot's joints (iii) Chronic syphilitic arthritis. (iv) Juxta-articular gummata.

Signs suggestive of syphilis are—(i) Joint disease without heat, pain, or tenderness. (ii) Bilateral painless hydrops of knees. (iii) Pupillary changes or absent knee jerks (iv) So called rheumatic fever type not responding to salicylates (v) Positive VDRL test of blood

(e) *Lymphogranuloma venereum*—(i) Chronic process with acute flare up and a tendency to relapse, may persist for weeks or months (ii) Polyarticular involvement commonly of knees, ankles and wrists. (iii) Swelling usually confined to periarticular tissues. (iv) Other evidences of lymphogranulomatous infection, e.g rectal stricture may be found (v) Positive Frei test.

**Bradycardia-tachycardia syndrome** (Sick-sinus syndrome)—Consisting of alternating bradycardia due to sinus arrest, sinus bradycardia, or S-A exit block combined with tachycardia from paroxysmal atrial or junctional arrhythmias, it may produce symptoms referable to either the slow or fast heart rates

## Ectopic Beats (Extrasystoles)

*Definition*—Cardiac contractions which arise prematurely from a normal or abnormal pacemaker.

**Varieties:**

1. **Atrial:**

*Causes*—Rheumatic heart disease notably mitral valve disease, congenital or acquired non-rheumatic MR, ischemic heart disease, thyrotoxicosis, acute or chronic lung disease, ASD, thoracic surgery, alcohol, tobacco or caffeine excess, idiopathic.

*E.C.G.*—Abnormal P wave configuration which is usually followed by a normal QRS (Fig. 2.5). The P wave which may be hidden within the preceding T wave is usually upright but may be inverted or biphasic. P-R interval more than 0.12 sec. No QRST complex following P wave if impulse reaches A-V node when it is refractory (blocked atrial ectopic).

*Clinical significance*—(i) If associated with underlying heart disease they may herald other atrial arrhythmias. (ii) Occurring in mitral stenosis they presage onset of atrial fibrillation. (iii) Multifocal extrasystole do not occur with normal heart.

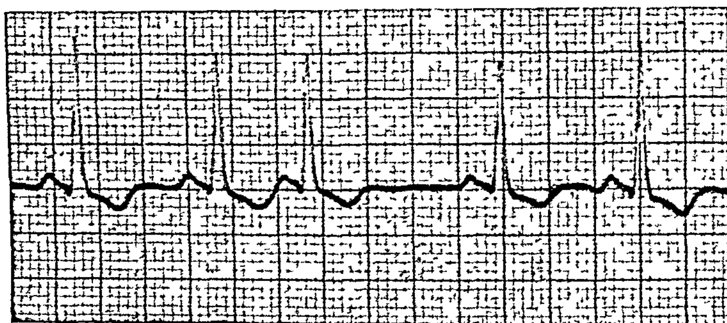


Fig 2 5 Atrial premature beat

2. **Junctional** (Nodal)—

*Causes and significance*—Same as for atrial ectopics.

*E C G.*—Premature P wave followed by QRST complex or P wave buried in QRS complex or follows it. Full compensatory pause. P-R interval less than 0.12 sec. (Fig. 2.6).

II. *Increased production of uric acid*—1. Increased turnover of preformed purines—(a) Lymphoproliferative and myeloproliferative disorders—Hodgkin's disease, leukemias, lymphosarcoma, myeloma, polycythemia rubra vera, Waldenstrom's macroglobulinaemia. (b) Carcinomatosis. (c) Gaucher's disease, chronic haemolytic anemias, secondary polycythemia, severe exfoliative psoriasis.

2. Increased purine synthesis de novo—(a) Idiopathic. (b) HG-PRT deficiency. (c) PRPP synthetase over-activity. (d) Ribose-5-phosphate over-production (e) Glucose-6-phosphate deficiency.

TREATMENT—

*Acute attack*—Non-steroidal anti-inflammatory drugs—(a) Indomethacin 50 mg p o. 4-6 hourly until attack subsides, then tapered off over 7-10 days. (b) Phenylbutazone 200 mg. t.d.s after food. (c) Colchicine 1 mg. stat, followed by 0.5 mg. 2-hourly until attack is controlled. Can cause diarrhoea. (d) Corticotrophin gel—60-100 units IM daily for 2-3 days may terminate severe attack.

*Long-term management*—Indications—Recurrent attacks, tophaceous gout, presence of renal disease, young patient with high uric acid level and family history of renal or heart disease Diet—low in purines and fats. No sweet bread, kidney, liver, meat extracts, peas, beans and lentils.

*Drugs*—Allopurinol inhibits xanthine oxidase and prevents formation of uric acid from purines. Dose 300 mg. daily, adjusting the dose after checking uric level at 3 months. Colchicine 0.5 mg. b.d. should also be given for 3 months. Probenecid—if intolerance to allopurinol 0 5-1.0 g. b.d. or Sulphinpyrazone 100 mg. t.d s. (to be avoided in patients with urolithiasis or purine over-production).

**(b) Chondrocalcinosis**

(Pseudo-gout, calcium gout)—Form of synovitis resembling gout due to deposition of calcium pyprophosphate crystals in cartilage. Intermittent attacks of joint pain affecting large joints Attacks last for few days to several weeks. Joints most commonly affected are knees, hips and wrists. More common in women. Diagnosis by finding characteristic crystals in synovial fluid

**(c) Ochronosis**

Primary degenerative disease affecting principally shoulders, knees, hips and spine. Alkaptonuria. Ear, nose and costochondral cartilages appear brown, brown spots in sclera.

**Symptoms :**

1. No symptoms in about 50%.
2. Disagreeable sensation due to large beat, or fear of heart stopping due to long pause.
3. Pain and neurosis in hypersensitive subjects.
4. Dizziness and faintness if premature beats numerous.
5. Fluttering sensation if premature beats in quick succession.

**Signs :**

1. *Pulse*—Quick beat followed by pause, less than compensatory in atrial and nodal and equivalent to two sinus cycles in ventricular premature beat ending in pulse more forceful than its predecessors. Early beat faintly palpable or impalpable at peripheral pulse (pulse deficit).
2. *Heart sounds*—(a) 1st sound—Generally accentuated in all ectopic beats since filling of the ventricles is interrupted and valves are still open. (b) 2nd sound—Normal splitting in atrial and nodal and wide splitting due to ventricular asynchrony. If extrasystole is so premature that there is insufficient ejection of blood no 2nd sound.
3. *Cannon waves*—In ventricular premature beat, cannon 'a' wave in jugular pulse coincides with or just follows 1st heart sound or carotid impulse in contrast with cannon waves in atrial premature beat which just precedes 1st sound or carotid impulse.

*Differential Diagnosis*—See table on page 123.

**Treatment :**

1. *If no underlying organic heart disease*—No treatment except reassurance regarding harmlessness of the condition. Sedative like Phenobarbitone 30 mg. t d s. or tranquilliser such as Chlordiazepoxide 10 mg. t d s. If symptomatic and persistent, quinidine sulphate 0.2 gm. q.d s. or propranolol 10-20 mg. t d.s.
2. *Treatment of underlying condition or causative factor*—such as excessive intake of alcohol, smoking, tea or coffee.
3. *Chronic organic heart disease*—(i) Quinidine 200-400 mg. every 6 hours. If ineffective, procaine amide 250-750 mg. every 6 hours. (ii) Diphenyl hydantoin 100 mg. q d.s. particularly effective in patients with digitalis-induced premature beats. (iii) Disopyramide 100 mg. t.d s. (iv) Propranolol or Oxprenolol 10-40 mg. q d s. more effective for atrial premature contractions, may be used for ventricular ecto-

(b) *Sarcoidosis*—Skin or pulmonary lesions. Positive biopsy and Kveim test.
(c) *Hemochromatosis*—Small joints of hands often involved particularly second and third metacarpo-phalangeal joints.

## 11. VIRUS DISEASES

**Classification:**

NERVOUS SYSTEM (virus encephalitides)—

(a) Neurotropic viruses which involve only the nervous system —(i) Poliomyelitis. (ii) Rabies.

(b) Neurotropic viruses which invade the nervous system in addition to other tissues of the body—
   (i) Diseases in which CNS lesions are most prominent—(i) Epidemic encephalitis—encephalitis lethargica, St. Louis encephalitis, Western and Eastern equine encephalitis. (ii) Nonepidemic—lymphocytic chorio-meningitis.
   (ii) Diseases in which the CNS is occasionally involved—Mumps, herpes zoster, measles, infectious mono-nucleosis.
   (iii) CNS lesions which appear during the convalescent period of a number of unrelated diseases—post-infectious encephalitis.
   (iv) CNS diseases which possibly have a viral etiology—Disseminated encephalomyelitis, disseminated sclerosis, disseminated myelitis with optic neuritis, hemorrhagic encephalitis, acute infective polyneuritis.

SKIN—Smallpox, chickenpox, vaccinia (cow-pox), measles, rubella, herpes simplex, herpes zoster, lymphogranuloma venereum, molluscum contagiosum, verrucae (warts).

RESPIRATORY TRACT—Influenza, parainfluenza, primary atypical pneumonia, psittacosis, pleurodynia, common cold.

EYE—Herpes simplex of cornea; epidemic kerato-conjunctivitis, trachoma, vaccinia.

MISCELLANEOUS—Infective hepatitis, epidemic diarrhoea, dengue fever, epidemic parotitis, phlebotomous fever, foot-and-mouth disease, viral hemorrhagic fevers including yellow fever and dengue hemorrhagic fever.

**Laboratory diagnosis:**

1. *Microscopic demonstration of the virus*—or demonstration of morphology and localization of abnormal structures in

2. *Pulse apex deficit*—Pulse rate considerably less than apex rate because some systolic contractions are feeble.
3. *Heart sounds*—variation in intensity of 1st sound. 2nd sound may not be heard if the ventricular contraction is too weak to open the semilunar valves.
4. *Murmurs*—Systolic murmurs preserved, louder following longer cycles and fainter after shorter cycles. No presystolic accentuation of diastolic rumble of mitral stenosis except when there is a short diastole.
5. *Neck vein pulsations*—Rarely rippling fibrillary waves. Usually no evidence of either atrial contraction or relaxation i.e. no *a* waves or negative *x* descent.

*E.C.G.*—(Fig. 2.8, 2 9). (a) Absence of normal P waves. (b) Presence of fibrillary waves. (c) Amplitude of R wave varies from beat to beat.

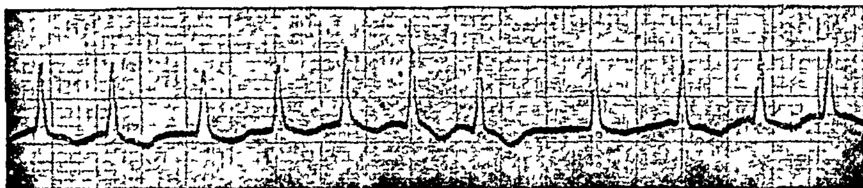


Fig. 2 8 Atrial fibrillation with rapid rate

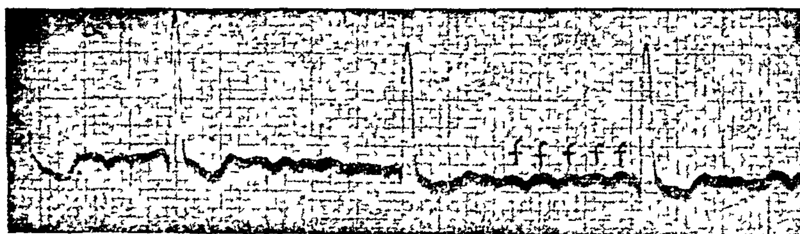



Fig. 2 9 Slow atrial fibrillation. Digitalis effect

**Differential Diagnosis:** See table on page 123

**Treatment:**

1. *Treatment of underlying heart disease (if any), or the precipitating cause.*

2. *Digitalis*—to slow the ventricular rate. Digoxin 2 tablets (0 5 mg.) t.d.s. till the heart rate is about 90/min., then 1 t d.s. till rate comes to about 80, then maintenance dose of 1-2 tablets daily. Heart rate should also be checked on effort because in some patients the A-V block is adequate at rest but not on exertion.

3. *Beta blockers*—to potentiate A-V block in some patients uncontrolled by adequate digitalis alone.

nates a certain strain of non-hemolytic streptococcus designated MG. These antibodies arise during the 2nd or 3rd week of illness.

**Chemotherapy of virus diseases—Antiviral compounds:**

1. *Amantadine*—for influenza A virus. Continuous oral administration of 200 mg./day orally is as effective as vacciniation in prophylaxis. If started early in the illness the drug will reduce duration and severity of symptoms.
2. *Idoxuridine* (IDU)—acts by inhibiting the replication of the virus. Uses—(i) Herpetic keratitis—0.1% drops or 0.5% ointment. (ii) Herpetic gingivostomatitis—5% solution applied to affected parts. (iii) Herpetic whitlow—35-40% idoxuridine in dimethyl sulphoxide. A piece of lint soaked in the fluid is applied over the affected finger. (iv) Genital herpes—in men—Topical application of 20% IDU in DMSO (v) Herpes zoster—35% applied continuously for 4 days on lint.
3. *Vidarabine*—Active against virus of herpes group. IV 10 mg /kg./day in herpes simplex encephalitis, or in chickenpox or herpes zoster in immunocompromised patients. Useful in chronic hepatitis B carriers. Ointment 3% for herpetic keratitis.
4. *Acyclovir*—Effective topically against ocular herpes simplex and parenterally against a variety of herpes infections in patients with neoplastic disease.
5 *Interferons*—may be useful in viral respiratory infections, in varicella and herpes zoster in compromised hosts. Prophylactically against cytomegalic virus infections in transplant recipients.
6 *Methisazone*—in smallpox prophylaxis and treatment of severe complications following vaccination (now of historical interest).

## 12. HYPERLIPOPROTEINAEMIAS

**Definition:** *Hyperlipoproteinaemias* are disturbances of lipid transport resulting from abnormalities in synthesis or degradation of plasma lipoproteins *Hyperlpaedemia* is a rise in palsma cholesterol, triglycerides or both.

TYPES: of lipoproteins—1. *Chylomicrons,* which transport exogenous or dietary fat 2. *Very low density lipoproteins* (VLDL) which transport endogenous triglyceride. 3. *Low density lipoprotein* (LDL) which transport cholesterol to peripheral cells.

or idiosyncrasy exists. (iii) Dosage—0.2 gm. every 2 hours for 5 doses, if this fails 0.4 gm. every 2 hours for 5 doses. ECG should be taken frequently in order to detect early evidence of myocardial toxicity. *Toxicity*—(i) Myocardial effects—Syncope due to ventricular fibrillation or asystole which may precede convulsions and death. Ventricular premature beats, AV block, ventricular tachycardia, 50% or more increase in QRS. (ii) Systemic embolism. (iii) General—(a) Due to idiosyncrasy—Fever, urticaria, purpuric rashes, nausea and vomiting. (b) Due to over-dosage—Deafness, tinnitus, tremor, blurring of vision.

## Atrial Flutter

**Causes:** Same as A. fibrillation, but atrial flutter is more often associated with heart disease than atrial fibrillation.

**Diagnosis:**

1. *Pulse*—(a) Regular rate of about 150 per minute. (b) Abrupt drop in rate to half the previous rate due to shift from 2 : 1 to 4 : 1 block may occur.
2. *Jugular venous pulse*—Regular small rapid pulsations (flutter waves) may be seen.
3. *Heart sounds*—1st heart sound may vary in intensity due to minor changes in P-R interval.
4. *Cartoid sinus pressure*—Usually slows the ventricular rate to half. On release of pressure ventricular rate returns to previous level.
5. *E.C.G.*—Saw-tooth (picket fence) appearance of atrial waves (Fig. 2.10) with ventricular response following every 2nd, 3rd (upto 8th) P wave.

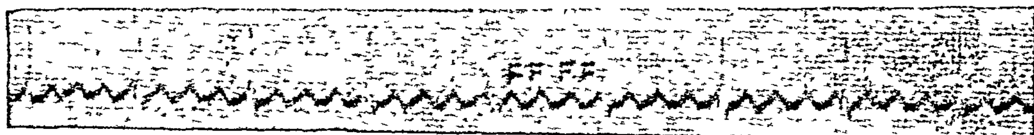


Fig. 2.10 Atrial flutter with 4·1 block.

**Differential Diagnosis:** See pages 122, 123.

**Treatment:**

1. *Treatment of the underlying cause*—where possible, e.g, thyrotoxicosis, rheumatic mitral disease, atrial septal defect or rarely digitalis intoxication.

foods suggests allergy, highly seasoned foods precipitate diarrhoea of gastric origin.
(iv) Duration—if more than 3 years, not likely to be colonic carcinoma.

(b) *Abdominal pain*—Colicky lower abdominal pain associated with bouts of alternating constipation and diarrhoea may suggest colonic obstruction or diverticulitis. Abdominal pain with fatty diarrhoea in recurrent pancreatitis, tuberculosis or Crohn's disease.
(c) *Rectal tenesmus*—Cause in rectum or lower sigmoid. Also in ulcerative colitis or diverticulitis.
(d) *Abdominal distension*—Malignant disease, regional enteritis or intestinal tuberculosis.

3. SIGNS—
   (a) *Abdominal tenderness*—Diffuse in intestinal tuberculosis, over colon with diffuse colonic lesions.
   (b) *Doughy feel*—With abdominal tuberculosis.
   (c) *Abdominal bruit*—May be heard with stenosis of superior mesenteric artery.
   (d) *Mass*—Carcinoma, tumour or diverticulitis.
   (e) *Anal abnormalities*—Fissures, perianal or ischiorectal abscesses and fistulae may present as a complication of ulcerative colitis or Crohn's disease.

II **Character of faeces and rectal discharges**—

1. *Mucus and blood*—Amoebic and bacillary dysenteries.
2. *Profuse purulent discharge*—chronic ulcerative colitis.
3. *Mucus*—Mucous colitis, chronic constipation, following ingestion of strong purgatives, rarely in ulcerative colitis.
4. *Fatty stools*—Voluminous, pale pasty stools in steatorrhoea.
5. *Frequent soft, non-fatty stools*—Diarrhoea of gastric origin.
6. *Large fermentative stools*—Sprue, nutritional deficiency states, fungus infections, intestinal carbohydrate dyspepsia.
7. *With excessive bile*—Gastro-intestinal hypermotility induced by vigorous purgatives or after severe gastroenteritis, fistula between biliary tract and alimentary canal in a patient who has suffered from biliary colic attacks
8. *Watery stools*—Emotional diarrhoea, internal fistulae, reflex diarrhoea, extensive regional enteritis, ulcerative colitis.

III. **Digital examination of rectum**—To exclude malignant lesion and ulcerative colitis where changes in the mucous membrane can be felt. Also to exclude pelvic inflammatory disease and obstruction due to extra-colonic lesions.

(b) *Psychic and reflex nervous symptoms*—Anxiety, coldness, sweating, and dizziness. Abdominal distension, nausea and vomiting Polyuria at end of attack.



Fig 2 11 Paroxysmal atrial tachycardia Rate 214 per minute

(c) *Cardiovascular*—If heart diseased or paroxysm prolonged —(a) Symptoms due to cerebral anaemia—syncope or Adams-Stokes syndrome. (b) Cardiac failure especially when there is underlying heart disease or in children.

**Signs**—Regular heart rate of 160-220 min. Vagal stimulation by carotid sinus pressure or Valsalva manoeuvre may cause sudden reduction in heart rate.

*E.C.G.*—Three types of patterns: (i) Rapid rate with normal ventricular complexes. Atrial activity is often difficult to identify but there is 1 : 1 A-V response (Fig. 2.11). (ii) A faster atrial rate with 2 : 1 response. This is found in digitalis toxicity and acute ischemia. (iii) 1 : 1 A-V response with aberrant A-V conduction resembling bundle branch block and simulating ventricular tachycardia.

*Differential diagnosis*—See table on p. 122.

**Treatment:**

**A Of attack:**

1. *Sedation and reassurance.*
2. *Mechanical measures to increase vagal tone*—(i) Carotid sinus pressure, first on right, then on left side for 3 to 5 seconds at a time. Should not be done in patients with history of cerebro-vascular insufficiency. (ii) Valsalva manoeuvre—Have the patient inhale deeply, hold his breath and then strain down hard when he counts slowly to 10. (iii) Drinking a glass of ice-cold water. (iv) Induction of gagging or vomiting by placing a finger in the oropharynx. (v) "Diving reflex"—While the breath is held the patient immerses his face into a basin of cold water.

Combined hyperlipaedemia—(a) Familial combined hyperlipaedemia. (b) Hypothyroidism. (c) Nephrotic syndrome. (d) Transplant patients. (e) Immunosuppressive or glucocorticoid therapy.

Clinical presentation: of hyperlipaedemia—1. Asymptomatic and undetected until a complication occurs such as myocardial infarction due to early atherosclerosis, or during screening of suspects such as family members. 2 Xanthomas—Eruptive (severe hypertriglyceridaemia), palmar or plantar (board $\beta$ disease) or tendon xanthomas (familial hypercholesterolaemia). 3. Lipaemia retinalis. 4. Acute pancreatitis.

**Management:** of hyperlipaedemia

INDICATIONS—1. Young primary hypercholesterolaemic hypertriglyceridaemic patients, especially if there is family history of early onset cardiovascular disease. 2. All hypertriglyceridemic patients with levels in excess of 1500 mg./dl. to prevent pancreatitis.

1. *Diet*—Calorie restriction and exercise in overweight patient Reduction of saturated fats and replacement with unsaturated fats (vegetable) oils. Increase in carbohydrate content to about 55% of total calories.

2 *Drug therapy*—Lipid lowering drugs if diet alone fails to correct raised plasma levels adequately: (a) Hypertriglyceridemia—Clofibrate 1 g b d. (ii) Nicotinic acid 2-9 g./day in divided doses. Start with 250 mg./day and gradually increase to maintenance dose to avoid flushing and GI intolerance. (b) Hypercholesterolaemia—Bile acid binding resins Cholestyramine 12-32 g./day or Colestipol 15-40 g /day in divided doses with meals, and multivitamin preparation at night (b) Nicotinic acid in combination with resin effective in resistant cases of familial hypercholesterolaemia or combine rises of plasma triglyceride and cholesterol.

## 13. IMMUNOLOGICAL DISORDERS

**Definition**—Any condition in which structural or functional damage is produced by action of immunological reactions of immunological competent cells or antibodies produced by the individual, with normal components of the body Immunity is normally concerned, not only with inactivation and rejection of micro-organisms and other foreign substances, but also in recognising that they are foreign. The essence of autoimmune disease is probably the failure at some point of this power of differentiating between the body's own material (self), and foreign

*E.C.G.*—Wide and bizarre QRS complexes usually at a rate of 160 or more. (Fig. 2.12) P waves independent of QRS complexes at normal sinus rate but as a rule difficult to detect. The rhythm may be slightly irregular. Carotid sinus massage has no effect.

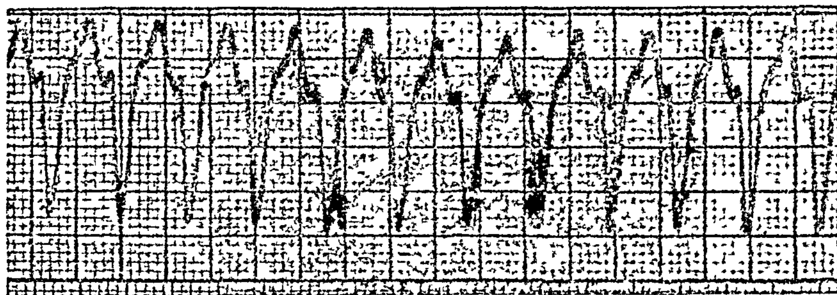


Fig 2.12 Ventricular paroxysmal tachycardia.

**Treatment:**

**A Of attack:**

1. *Electrical cardioversion*—Method of choice except when due to digitalis toxicity.
2. *Lidocaine* (Xylocaine)—Drug of choice in ventricular tachycardia associated with acute myocardial infarction. Also useful in digitalis induced arrhythmia. 50-100 mg. as single rapid IV dose. Onset of action usually within 5 minutes. The initial dose may be repeated every 20-30 minutes but the amount given in one hour should not exceed 500 mg. If initial repeated doses have been effective only transiently, continuous IV infusion delivering 1 mg. of the drug per minute may be effective. Side effects—hypotension, CNS depression and convulsions.
3. *Procainamide*—if ventricular tachycardia is resistant to lignocaine. Dose 25-50 mg./min. (total dose 1 g.) IV slowly under continuous E C.G. monitoring.
4. *Propranolol*—1.0 mg/min. slowly IV upto total of 10 mg. especially if tachycardia induced by digitalis. *Oxprenolol* 1-2 mg. IV, repeated after 10-20 minutes if necessary.
5. *Quinidine*—0 2 g. orally every 2 hours for 5 doses.
6. *Mexiletine* (Mexitil)—100 mg. IV over 5 minutes followed by infusion of 250 mg. over one hour and a further 250

nunctivitis, and gastrointestinal cow's milk allergy of infants.

2 *Membrane-reactive immunity*—When antibody combines with an antigenic determinant forming part of a cell membrane, this is often followed by complement fixation and cell lysis e.g. incompatible blood transfusion, drug-induced hemolysis, agranulocytosis or thrombocytopenia. Sometimes stimulation of cell function results e.g. Grave's disease.

3 *Deposition of immune complexes*—(a) *Acute*—(i) Acute serum sickness (ii) In menigococcal meningitis, after treatment with penicillin there may be a second phase of fever, skin rash and arthritis due to deposition of immune complexes in small vessels and skin. (b) *Chronic immune complex disease*—due commonly to persistence of antigen—(i) Infections—Bacterial: SBE, menigococcal infection, leprosy. Protozoal: malaria. Viral: hepatitis B, dengue fever. (ii) Exogenous antigens—Dietary: Gluten sensitivity. Occupational: extrinsic allergic alveolitis. Drugs: serum sickness, penicillin, SLE syndrome (procainamide, hydralazine), sulphonamides (iii) Autoimmunity—IgG: rheumatoid disease. Nucleic acids: SLE. (iv) Neoplasia—Tumor antigens: lymphoma, carcinoma

4. *Cellular mechanism of tissue damage*—Antibody dependent cellular cytotoxicity plays a part in renal homograft rejection, in autoimmune thyroiditis, and probably in other autoimmune conditions.

**Autoimmune diseases in Man:**

1 *Liver diseases:*

| | |
|---|---|
| Acute viral hepatitis | Cryptogenic cirrhosis |
| Chronic active hepatitis | Alcoholic liver disease |
| Primary biliary cirrhosis | Hepatic drug sensitivity |

2. *Gastrointestinal disease:* Atrophic gastritis and pernicious anemia. Coeliac disease. Inflammatory bowel diseases—Ulcerative colitis, Crohn's disease.

3 *Renal:* Glomerulonephritis.

4. *Connective tissue diseases:* Rheumatoid arthritis, SLE, Sjogren's syndrome.

5. *Endocrine diseases:* Thyroiditis, primary thyrotoxicosis, idiopathic Addison's disease, diabetes mellitus, idiopathic hypoparathyroidism

6 *Blood diseases:* Immune hemolytic anemias—Autoimmune, drug-induced, isoimmune Immune thrombocytopenias. Immune granulocytopenias.

## D.D. of irregular tachycardia

| | *Multiple ectopic beats* | *A. fibrillation* | *A. flutter (with varying block)* | *Sinus arrhythmia (with tachycardia)* |
|---|---|---|---|---|
| 1. Associated condition | Idiopathic, ischaemic heart disease, digitalis toxicity, etc. | Rheumatic heart disease, thyrotoxicosis, ischaemic or hypertensive heart disease, or none | Same as in A. fibrillation | Normal heart. Common in children |
| 2. Rate at apex | Usually less than 120 | More than 120 | About 160 | Less than 140 |
| 3. Effect of exercise | Disappear | Rhythm becomes more irregular | May become regular | Disappears |
| 4 Pulse apex deficit | May be present | Marked | None | None |
| 5. Heart sounds | Occasionally only 1st sound heard | Vary in intensity | Variation of 1st heart sound | Normal |
| 6 Other features | Long pauses preceded by premature beats Irregular cannon waves in jugular pulse | Pauses without preceding premature beats More often permanent | Jugular pulse shows flutter waves More often paroxysmal | Rhythm becomes regular if breath is held |

responses. (ii) Transformation responses—Blast transformation of lymphocytes measured by incorporation of thymidine into newly synthesised nucleic acid. (iii) Mediator release —T cells release a number of mediators following antigen challenge which can be measured (iv) Immunoglobulin production—for B cell function. (c) Structural analysis—Lymphoid tissue—(thymus, peripheral nodes etc.) detected clinically or by radiographs Histopathological examination of bone marrow, intestinal mucosa or lymph nodes.

3 PHAGOCYTES—(a) *Skin window test*—assesses neutrophil efflux onto a glass slide (or tissue chamber) at site of a standardized wound or skin abrasion. Phagocytes may be evaluated under microscope or by measuring residual viable bacteria after incubation with neutrophils (b) *Phagocytosis*—activates neutrophil oxidase which can be measured by reduction of the dye into blue tetrazolium. Phagocytosis also produces free energy with emission of light measured by technique of chemiluminescence.

**Immunotherapy :**

1. *Corticosteroids and immunosuppressive drugs*—for treatment of connective tissue diseases involving immune complex deposition or other immune reactions.
2. *Thymic hormones*—e.g. Thymosin for primary immunodeficiencies of infancy, acquired immunodeficiency associated with viral infections or cancer, patients with thymic hypoplasia.
3. *Transfer factor*—Favourable response in severe combined immunodeficient, ataxia telangiectasia, and about half of patients with recurrent infections and eczema associated with Wiskott-Aldrich syndrome, and some cases of chronic mucocutaneous candidiasis.
4. *Levamisole*—may control herpes virus infections of cornea, mouth and genitalia. Used for mouth ulcers and warts and in rheumatoid arthritis.
5. *BCG*—can prolong disease-free intervals after treatment by chemotherapy or surgery in acute lymphocytic and myeloid leukemia, malignant lymphoma and malignant melanoma.

## 14. COLLAGEN (CONNECTIVE TISSUE) DISEASES

**Definition :** A group of clinical syndromes having certain histological features in common, such as widespread inflammatory changes in the connective tissue and the production of fibrinoid change in the ground substance. Each of these diseases

*Causes*—Vagal overactivity due to hyperactive carotid sinus, drugs such as digitalis or quinidine, ischaemic heart disease especially acute inferior myocardial infarction, diphtheria.

*Diagnosis*—(a) Intermittent pulse, halving of cardiac rate or long pause depending on frequency of dropped beats. (b) Abolished by exercise or atropine. (c) E.C.G.—Pause with complete absence of PQRST. P-P interval twice the dominant P-P interval. (Fig. 2.14)

*Treatment*—(i) Treatment of cause—e.g., digitalis intoxication. (ii) Propantheline—if long-term treatment is necessary. (iii) Pacing—is indicated for rare cases in which there is prolonged asystole and Stokes-Adams attacks.

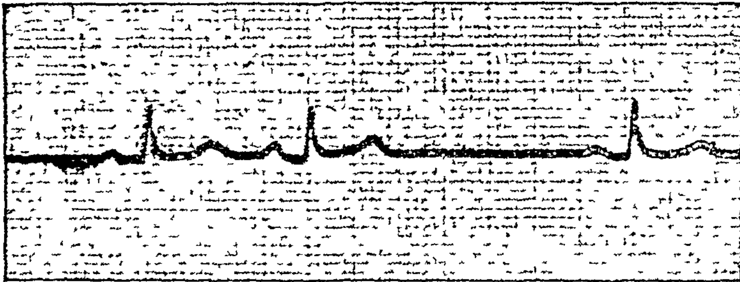


Fig. 2.14 S-A block. A complete PQRST complex is omitted and the P-P interval is twice the normal length

B. **Atrioventricular block**—may be acute or chronic.

I. **First degree block**—Prolonged PR interval.

*Causes*—Acute rheumatic fever, ischaemic heart disease, cardiomyopathy, A.S.D. Drugs—Digitalis, quinidine, emetine.

*Diagnosis*—(i) Atrial systole is so far removed from ventricular systole that it is audible, i.e. pre-systolic gallop rhythm. (ii) Decrease in intensity of 1st heart sound. (iii) Definite interval between presystolic murmur and 1st sound at the apex if mitral stenosis. (iv) If 'a' waves are observed on the side of the neck while the carotid pulse is palpated on the other, a prolongation of A-V conduction time can be judged. (v) Presence of cannon waves in the neck when P-R interval is so prolonged that P falls between QRS and T of the previous

or corticosteroid toxicity. 5. Dialysis and renal transplantation for late stage lupus nephropathy.

**Polyarteritis nodosa (PAN)**

*Pathogenesis*—Multisystem disease resulting from widespread necrotizing arteritis mainly involving medium-sized arteries. Higher incidence in males. PAN may be associated with drug addiction, lymphoproliferative disorders such as immunoblastic lymphadenopathy, and hairy cell leukemia, and may follow therapy with drugs e g. sulphonamides.

*Clinical features*—(a) Myalgias and arthralgias (b) Constitutional symptoms—Fever, malaise and weight loss. (d) CVS—Hypertension, tachycardia out of proportion to fever, silent myocardial infarction may occur. (e) GI—Abdominal pain—due to arteritis which may produce infarcts in any organ including liver and gallbladder. GI bleeding may occur (f) *Cutaneous*——Ulcers, digital vasculitis, gangrene and livedo reticularis. (g) Mononeuritis multiplex. (h) Renal—Proteinuria, hematuria and progressive impairment of renal function. (i) Lungs—Pulmonary infiltrates occasional.

*Diagnosis*—(1) Visceral arteriogarphy reveals aneurysms and irregularities in arteries of renal and coeliac axis. (b) Leucocytosis and raised alkaline phosphatase.

*Treatment*—Prednisolone 60 mg. daily with early addition of Azathioprine 2.5 mg./kg./day or Cyclophosphamide 2 mg./kg./day if reponse is slow. Plasma exchange or pulse methylprednisolone therapy for severe cases.

**Wegner's granulomatosis**—Multi-system disease with many similar clinical and laboratory features. Sinusitis, chronic rhinitis and nasal ulceration prominent early features. Pulmonary infiltrates and nodules and skin lesions often purpuric and nodular. Hypertension uncommon. Histology—Necrotizing vascultis and granuloma formation.

**Dermatomyositis and Polymyositis:**

*Classification and clinical features*—

1. *Typical polymyositis*—Most common type of myositis occurring mostly in females between 30 and 50 years. Insidious onset with skin rash, Raynaud phenomenon, mild arthritis
2. *Typical dermatomyositis*—occurs between 20-70. Erythematous skin rash on face (weepy facies), periorbital areas, neck and shoulders and at times on knuckles, elbows and knees (collodion patches). The dermal lesions appear in conjunction with progressive muscular weakness: Articular symptoms may resemble rheumatoid arthritis.



Fig 2 17 Mobitz type II block

(3) *Fixed type*—Ventricles respond to every second (Fig. 2.18), third or fourth beat—2 . 1, 3 : 1, 4 : 1, block, but the P-R interval remains constant. When the conduction is 3 : 1 or 4 : 1 the block is termed high grade A-V block. Pulse slow and regular. Neck veins show pulsations of atrial origin at a rate of two, or three, or four times faster than the radial pulse rate.

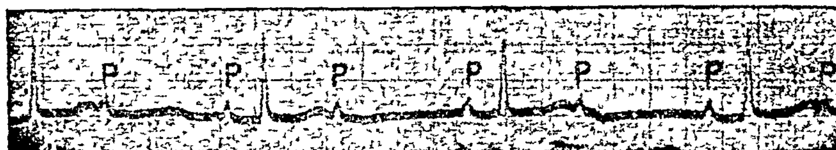



Fig. 2 18 2:1 A-V block. Atrial rate 80, ventricular rate 40 per minute

In regular 2·1 or 3 1 block, *it may be impossible to distinguish* between a high or Mobitz type I block and a low or Mobitz type II block on standard E C G., but the site of lesion can be localised by His bundle electrogram

**III Third degree block (Complete heart block)—**

CAUSES :

(a) *Congenital*—Usually associated with V.S D., rarely isolated.

(b) *Acquired heart disease*—

1. Coronary atherosclerosis—especially diaphragmatic surface infarction.
2. Rheumatic heart disease.
3. Acute infections—Acute rheumatic fever, diphtheria.
4. Drugs—Digitalis, quinidine.
5. Calcific aortic stenosis.
6. Syphilitic heart disease.
7. Cardiomyopathy.
8 Infiltrative masses—Sarcoidosis, tubercles, abscesses from endocarditis, gummas, primary and metastatic tumours, amyloidosis, haemochromatosis.

**Giant Cell Arteritis (GCA)**—A condition associated with inflammation of temporal artery or medium or large arteries anywhere in the body.

*Clinical features*—

1 Polymyalgia rheumatica—Pain in shoulder or pelvic girdle, occasionally low back and neck. Morning stiffness.
2 Temporal arteritis—Headache in temporal region with tender swollen arteries.
3 Fever—May present as pyrexia of unknown origin.
4 Visual manifestations—Loss of vision.
5. Anemia.

**Polymyalgia rheumatica (PMR)**—Close relationship with GCA. Onset insidious or abrupt. Malaise, weight loss and low grade fever Stiffness and pain beginning in shoulders and neck and later affecting pelvic girdle. Proximal muscle tenderness occurs without weakness. PMR may be a manifestation of occult malignancy, early rheumatoid arthritis or a chronic infection such as SBE. Temporal artery biopsy should be done if symptoms of GCA.

## 15. INBORN ERRORS OF METABOLISM

Definition: A group of inherited disorders involving genetically determined abnormalities in wide variety of metabolic pathways or structural proteins. Each defect leads to a special clinical picture which can usually be predicted by the nature of the biochemical defect.

### The Porphyrias

Definition—Group of inborn errors in pathway of haem biosynthesis which result in excretion or accumulation of pophyrin in certain tissues.

Classification

I **Hepatic porphyrias**—

1. *Acute intermittent porphyria*—Most severe of hepatic porphyrias. Occurs usually in young adults. *Clinical features* —(i) Gastrointestinal symptoms most common Colicky abdominal pain, vomiting, severe constipation. (ii) CNS—Peripheral neuropathy with weakness and sensory impairment Epileptic fits may occur. (iii) CVS—Sinus tachycardia, hypertension. (iv) Psychiatric—Depression, hysteria, psychosis. Precipitating factors—Drugs especially barbiturates, pregnancy, infection, starvation.

6. *Cardiac enlargement*—due to increased stroke volume. Hyperdynamic cardiac impulse.
7. *Systolic ejection murmur*—loudest in 2nd and 3rd left interspaces adjacent to the sternal edge, and due to increased velocity of blood flow associated with increased stroke volume.
8. *Atrial sounds*—may be heard in inconstant relation to 1st and 2nd heart sounds
9. *Apical diastolic filling murmur*—occasional.

*E.C.G.*—(Fig. 2.19) No relation between atrial and ventricular complexes. The duration of QRS is normal. When the block is low the depolarising wave cannot follow the normal course, so that QRS complex is widened.

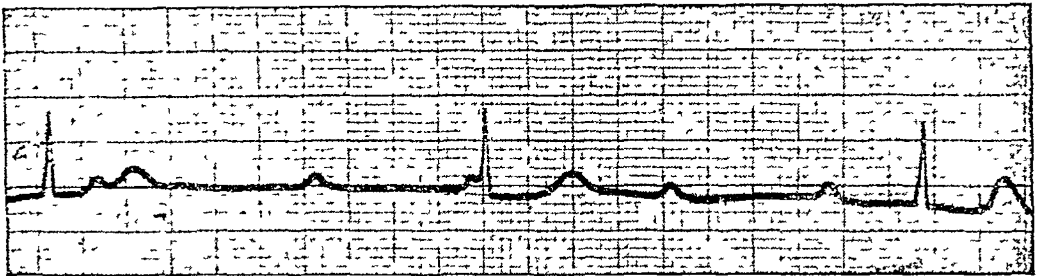


Fig. 2 19 Complete heart block.

**Differential diagnosis:**

(a) *Of bradycardia* (see table p. 130).
1. Complete heart block.
2. Sinus bradycardia.
3. Partial A-V block 2 : 1 or more.
4. S-A block 2 : 1 or more.
5. Nodal rhythm (A-V junctional rhythm).

(b) *Of A-V dissociation (by interference)*—Here the atrial impulses are not conducted to the ventricles because the A-V node is still within its normal refractory period.

| | *Complete A-V block* | *A-V dissociation* |
|---|---|---|
| *Cause* | Acute infarction, digitalis, cardiomyopathy, congenital | Digitalis, myocarditis or myocardial infarction |
| *Syncope* | Common | Uncommon |
| *Duration* | Often permanent | Usually transient |
| *E. C. G.* | | |
| Atrial rate | Usually faster than vent rate | Usually slower than vent. rate |
| Vent. rate | About 40/min. | Usually above 60/min |
| QRS complex | Supravent or vent. | Usually supravent |
| P falling after T | May occur | Does not occur. |

*Treatment*—Frequent carbohydrate feedings or porta-caval shunt procedures.

**Galactosaemia**

*Definition*—A disorder due to accumulation of galactose and galactose-1-phosphate with resulting tissue damage.

*Cause*—Disturbance in conversion of galactose to glucose.

*Clinical features*—Widespread symptoms and signs. Child ill in first week of life with vomiting, failure to thrive. Jaundice and hepatomegaly. Cataracts in about 50%. May be hypoglycaemic. Prone to infection. Evidence of renal tubular dysfunction.

*Diagnosis*—confirmed by demonstration of absent enzyme activity.

*Treatment*—Omission of lactose and galactose from diet Adequate proteins, calories and vitamins

**Homocystinuria**

*Definition*—Disorder of methionine metabolism in which there is a block in the trans-sulphuration pathway between methionine and cysteine.

*Cause*—Enzyme cystathionine synthase which with co-factor vitamin $B_6$ controls union of serine and homocysteine to form cystathionine. The block results in accumulation of homocysteine and its excretion in urine.

*Clinical features*—(a) Skeletal—Osteoporosis involving vertebral bodies with kyphoscoliosis, deformities of thoracic cage, genu valgum and flat feet Reduced mobility of joints, long fingers and toes and increase in height despite spinal curvature. (b) CVS—Coronary thrombosis due to narrowing of arteries. Pulmonary embolism may occur. (c) Brain—Mental retardation and epilepsy. (d) Ocular—Iridodonesis followed by downward dislocation of lens with resultant glaucoma, buphthalmia and optic atrophy. (e) RS—Asthma may occur Majority of children are disabled by age of 10.

*Diagnosis*—Positive cyanide-nitroprusside test in urine. Raised level of plasma methionine with low plasma cysteine.

*Treatment*—For pyridoxine sensitive patients—Pyridoxine hydrochloride about 600 mg./day with slight restriction of protein. For pyridoxine resistant patient—Methionine 130-150 mg./day given in natural protein and Cystine 100-300 mg./day. Vitamins and minerals.

**Treatment:**

1. DRUGS—(i) *Isoprenaline*—Isoprenaline sulphate 10-20 mg. sublingually 4-hourly, or sustained release isoprenaline hydrochloride 60-120 mg. every 8 hours or better 2-5 mg. in 500 ml. dextrose as IV infusion accelerates the heart rate in most patients. The rate of infusion should be adjusted to keep the heart rate between 70-100/min. (ii) *Atropine*—0.6-1.2 mg. may be successful in removing heart block during the earlier stages of acute myocardial infarction. (iii) *Corticosteroids*—especially for conduction defect after myocardial infarction or as complication of rheumatic fever. Dose 80 mg. for 2 days then reduced to maintenance level of 10-15 mg. daily.

2. PACING—*Indications*—(a) *Temporary cardiac pacing*—(i) Symptomatic complete or incomplete heart block unresponsive to medical therapy. (ii) Acute myocardial infarction complicated by significant conduction defect and/or tachyarrhythmia which causes cardiovascular collapse and is unresponsive to medical therapy. (b) *Permanent cardiac pacing*—(i) One Adams-Stokes attack. (ii) Severe limitation of exercise tolerance, or severe congestive failure. (iii) Diminished cerebral or renal blood flow. (iv) Symptomatic congenital heart block. (v) Complete heart block following cardiac surgery.

For emergency treatment of Adams-Stokes attack—See cardiac arrest.

## C A-V block at level of bundle branches:

### 1. Bundle branch block—

*Definition*: Delay in the spread of excitation through the ventricle whose bundle is blocked so that QRS interval is prolonged to 0.12 sec. or longer.

RIGHT BUNDLE BRANCH BLOCK—

*Causes*—Physiological, ischaemic heart disease, hypertensive heart disease, associated with congenital lesions e.g. A.S.D., lesions causing strain or hypertrophy of R.V.

*Diagnosis*—(i) Wide splitting of 2nd sound. (ii) E.C.G.—Wide QRS complex. S wave in lead I, R′ in lead $V_1$. (Fig. 2.20).

(b) *Genital warts*—Condylomata acuminata caused by DNA papova virus Incubation period about 3 months. On cold dry areas of genitals, warts are flat and small, in warm, moist areas filiform and large. Treatment—Application of podophyllin 10-25% dissolved in spirit. If no response to repeated applications try trichloracetic acid or electrocautery.

(c) *Molluscum contagiosum*—Dome-shaped shiny papules white or pink in colour with umbilicated centres. Treated by electrocautery.

(d) *Hepatitis*—Hepatitis B is common among homosexuals.

4 **Nonviral sexually transmitted diseases**—

(a) Scabies.

(b) Pubic lice or pediculosis.

(c) Candidiasis (Thrush)—Vaginal discharge and vulvovaginal itching. Treatment—Nystatin or clotrimazole locally. If necessary Nystatin 500,000 units t.d.s. orally.

(d) *Trichomoniasis*—Thin, yellow offensive vaginal discharge. Treatment—Metronidazole 400 mg. t.d.s. for 5 days or 2 g. in a single dose.

## 17. SOME COMMON SYMPTOMS AND SIGNS

**Alcoholism :**

A *Neurologic disorders*:

1 Alcoholic intoxication—Drowsiness, dysarthria, ataxia. In severe cases respiratory depression, stupor, coma and death.

2 Abstinence or withdrawal syndrome—Tremulousness, hallucinosis, delirium tremens, 'rum fits'.

3 Nutritional deficiency secondary to alcoholism—Wernicke-Korsakoff syndrome, polyneuropathy, retrobulbar neuropathy (tobacco-alcohol amblyopia), pellagra.

4. Other disorders—Cerebellar degeneration, primary degeneration of corpus callosum, central pontine myelinolysis, cerebral atrophy.

5 Neurogenic disorders due to portal cirrhosis and portal-systemic shunts—Encephalopathy, myelopathy.

6 Psychosis—Alcoholic hallucinations

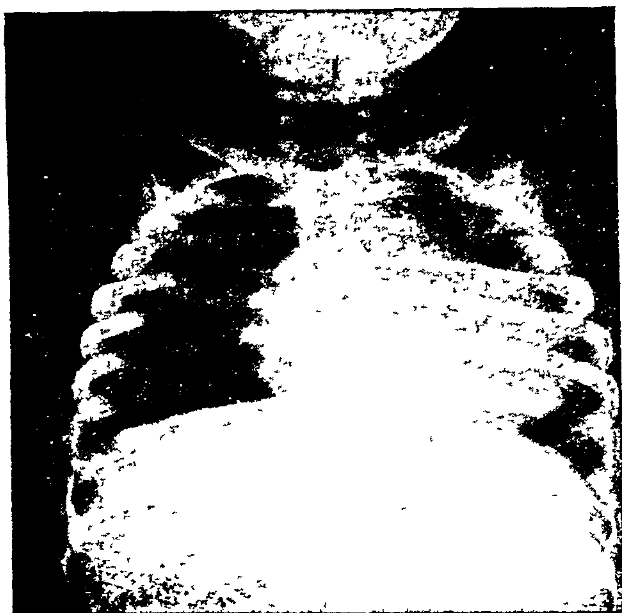
B. *Gastrointestinal*—

1 Acute gastritis, gastric ulcer.

2 Hepatic—Fatty liver, acute alcoholic hepatitis, cirrhosis.



Atrial septal defect Cardiac enlargement mainly of RV, prominent pulmonary outflow tract and large main pulmonary arteries and lobar arteries



Fallot's letralogy The apex of the heart is tilted upwards — boot-shaped heart (coeur en sabot)

B. *Secondary*—Chronic inflammation and suppuration e.g. bronchiectasis, tuberculosis, ulcerative colitis, rheumatoid arthritis, chronic osteomyelitis.

**Anorexia :**

1. *Infections and chronic diseases*—Acute febrile illness, chronic infections like tuberculosis. Hepatic, renal, cardiac, haemopoietic and adrenal disease.
2. *Due to lessened metabolic function*—Addison's disease, myxoedema. Simmond's disease.
3. *Local causes due to decreased hydrochloric acid secretion*—Carcinoma of stomach, chronic gastritis, pernicious anemia, etc.
4. *Nervous causes*—Mental worry, fear, anorexia nervosa.
5. *Deficiency of vitamins*—Particularly B complex.
6. *Physiological anorexia*—Inactive life, irregular eating and drinking, excess of carbohydrate food in between meals.

*Management*—(a) If symptomatic, the disease must be treated. Gastric lavage if there is pathological retention of food in the stomach (b) Diet—Appetising food. No sweets between meals. No hurry. (c) Exercise and fresh air. (d) Avoidance of excessive smoking and alcohol (e) Appetisers—Cyproheptadine hydrochloride (Periactin)—in dose of 2-4 mg. according to age as tablets or syrup b.d. Contraindicated in glaucoma and urinary retention Produces drowsiness, or rarely agitation and confusion (f) Vitamin $B_{12}$, multivitamins. (g) Insulin—10 units of plain insulin 10 minutes before lunch and dinner. May be gradually increased to 15-20 units. Usually given for 3 weeks or more. Oral antidiabetics may be used instead. (h) Anabolic steroid—Norethandrolone 50 mg. daily by mouth or 25 mg. I.M. once a week.

**Ataxia :**

1. *Sensory ataxia*—
   (a) Peripheral sensory nerves—Peripheral neuritis.
   (b) Posterior roots—Tabes, syphilitic pachymeningitis.
   (c) Posterior columns—Multiple sclerosis, spinal tumors, syringomyelia.
   (d) Post-central convolution—Disorders of parietal lobe
2. *Cerebellar ataxia*—
   (a) Cerebellum—Cerebellar tumor or abscess, cerebellar artery thrombosis, progressive cerebellar degeneration.
   (b) Cerebellar pathways—Cerebello-pontine angle tumor, encephalitis, Friedreich's ataxia.

left axis deviation in E.C.G. (more than —30°) with deflections which are dominantly positive in lead I and negative in leads II and III. Muscle necrosis of inferior wall of L.V. or L.V. hypertrophy may also produce similar pattern.

(ii) *Posterior fascicular block* (Left posterior hemiblock)—causes gross right axis deviation with deflections dominantly negative in lead I and positive in lead III. The pattern resembles that of right ventricular hypertrophy or lateral wall infarction.

(iii) *Bifascicular block*—Failure of conduction in two of the divisions causes RBBB with LAD, or complete LBBB.

(iv) *Trifascicular block*—Block in all three fascicles would result in complete heart block.

## 3. CARDIAC MURMURS

**Classification :**

I. INNOCENT—Associated with no known abnormality either structural or physiologic.

II PHYSIOLOGICAL—Murmurs caused by disturbance in the physiology of the circulation, e.g., those related to hyperkinetic state or overactive circulation—excitement, anaemia, fever, thyrotoxicosis, pregnancy, cor pulmonale, portal hypertension and beriberi heart disease.

III. RELATIVE OR FUNCTIONAL—Murmurs caused by structural disorders not involving valves or abnormal cardiac or vascular communications—murmurs caused by dilatation of heart chambers or dilation of vessels.

IV. ORGANIC—Murmurs caused by valvular disease, shunts or narrowed vessels.

### SYSTOLIC MURMURS

**I. Innocent systolic murmurs—**

CLINICAL FEATURES—(1) Soft. (2) Short. (3) Heard over limited area of precordium and not well conducted (4) Increase in volume with tachycardia, and decrease or disappear when heart rate slows. (5) Vary with respiration, either increasing or decreasing in volume with inspiration. (6) Always systolic in time (except venous hum). (7) Usually vary with posture. (8) Heart is otherwise normal.

TYPES :

(a) *Vibratory murmurs*—Short, early systolic murmur, best heard down left sternal edge and sometimes towards apex. Of

fibrous dysplasia). 3. Watson's syndrome (Pulmonic stenosis). 4 Normal individuals (about 10%).

**Cannon ('a') waves:**

*Isolated*—Ventricular ectopics.

*Regular*—(a) At normal heart rate: Nodal rhythm, sinus rhythm with prolonged PR (b) At rapid rate· Supraventricular tachycardia especially nodal.

*Irregular*—(a) Slow rate Complete heart block (b) Fast rate. Ventricular paroxysmal tachycardia.

**Carpal tunnel syndrome:**

1. Idiopathic
2. Compression of median nerve by fracture, oedema or tenosynovitis.
3. Rheumatoid arthritis
4. Osteoarthritis.
5. Myxoedema.
6. Acromegaly.
7. Palindromic rheumatism.
8. Primary amyloid.

**Clubbing of fingers:**

1. *Symmetrical*—
   - (a) *Acquired*—(i) Pulmonary—Pleural, mediastinal or pulmonary disease due to compression, infection, foreign body or neoplasm. (ii) Cardiac—Cyanotic congenital heart disease, S.B.E., occasionally congestive cardiac failure (iii) Liver disease—cholangiolitic cirrhosis. (iv) Gastrointestinal—ulcerative colitis, chronic dysentery, idiopathic steatorrhoea. (v) Miscellaneous—Myxoedema, particularly iatrogenic; exophthalmic ophthalmoplegia.
   - (b) *Hereditary*—May be familial condition and is often asymmetrical.
   - (c) *Idiopathic*—Cases without family history or recognizable underlying disease.
2. *Unilateral*—Aneurysmal dilatation of aorta or its branches, brachial A-V fistula, Pancoast tumor, erythromelalgia and lymphangitis.
3. *Unidigital*—May be hereditary if it is bilateral. Can result from median nerve injury, local trauma, tophaceous gout.

(b) **Pansystolic:**

1. *Mitral regurgitation*—due to left ventricular dilatation from any cause—hypertension, ischaemia, aortic valve disease. (See p. 135).

| | Organic MR | Relative MR |
|---|---|---|
| Murmur | | |
| Intensity .. | Harsh and loud | Soft and blowing |
| Duration ... | Pansystolic | Of short duration Often late systolic |
| Radiation . | To left axilla or to aortic area | Little radiation<br>Murmur may vary in intensity with change of position |
| Sounds ... | 1st sound obscured by murmur 3rd heart sound may be heard $P_2$ may be accentuated | 1st sound normal 3rd heart sound not heard Mid or late systolic clicks common |
| Thrill ... | Systolic thrill with very loud murmurs | No thrill |
| Cause . | Rheumatic fever | LV enlargement due to hypertension, myocardial infarction, etc |
| Associated MS . | Often present | No |
| Persistence of murmur | Murmur does not disappear with treatment | Murmur may disappear with improvement of circulatory status |
| Fluoroscopy ... | Systolic expansion of left atrium | No systolic expansion of left atrium |

2. *Tricuspid regurgitation*—Any condition giving rise to R.V. dilatation or failure e g. pulmonary hypertension, high output states, pulmonary stenosis, atrial fibrillation.

**IV. Organic systolic murmurs—**

(a) **Ejection systolic:**

1. *Aortic stenosis*—Ejection systolic murmur, loud, harsh, best heard in second right interspace. Aortic second sound diminished or absent Systolic thrill in aortic area. Anacrotic pulse.
2. *Pulmonary stenosis*—Loud, harsh, ejection systolic murmur in pulmonary area $P_2$ soft and delayed or absent. Systolic thrill in pulmonary area.
3. *Fallot's tetralogy*—The murmur is due to pulmonary stenosis. The right ventricle has two exits so that

chitis. (iii) Lungs—pneumonia and bronchopneumonia, lung abscess, bronchiectasis, pulmonary tuberculosis, whooping cough, pleurisy.

2 *Mechanical irritation*—(i) Nose and throat—enlarged tonsils, long uvula, chronic catarrh, chronic sinusitis, smoker's throat. (ii) Respiratory tract—Foreign body in larynx or bronchi, bronchial asthma and eosinophilic lung, bronchogenic carcinoma, pneumokonioses, infarction of lung, pulmonary congestion, irritant gases. (iii) Mediastinum—aortic aneurysm, enlarged mediastinal glands, growth of thymus, large pericardial effusion, dilated left atrium in mitral stenosis.

3 *Reflex*—rare, due to stimulation of vagus, e.g. disease of or wax in external ear; or over loading of stomach, or distension of colon.

**Cranial bruits:** in the adult.

1. Transmitted from aortic or carotid artery stenosis.
2. Carotid-cavernous sinus fistula.
3 Arterio-venous malformtions of cerebrum.
4 Angiomatous conditions in the orbit.
5. Vascular intracranial tumors, e.g. some meningiomas.
6. Glomus jugulare tumors.

**Cyanosis:**

1 *Central cyanosis*—is due to a central mechanism—diminished arterial oxygen saturation. It is visible in the skin (nose, cheeks and fingers), and in warm areas viz. those richly supplied with blood vessels (tongue, lips, conujunctivae). Central cyanosis, if severe and of long duration is associated with clubbing of fingers, and polycythemia. (i) Veno-arterial shunts—e.g. Fallot's tetralogy, Eisenmenger's syndrome. (ii) Impaired arterial oxygenation—(a) Impaired diffusion of oxygen due to pulmonary disease e.g. consolidation, atelectasis, emphysema, fibrosis. (b) A low partial pressure of the alveolar oxygen as occurs at high altitudes.

2 *Peripheral cyanosis*—is due to a peripheral mechanism i.e an increased arterio-venous oxygen difference. It is visible only in the skin (nose, cheeks, fingers) and not in warm areas (tongue, lips, conjunctivae). Clubbing of the fingers and polycythemia do not occur. Causes—(a) Slowing of circulation due to cold, or excess vasomotor stimulation. (b) Oxygen deficiency with carbon dioxide accumulation—obstruction to trachea, venous congestion. (c) Increased

3 *Disease of the mitral chordae*—An abnormal mitral valve with elongated chordae may become incompetent during the course of systole. There is usually a mid-systolic click initiating the murmur which runs upto the second sound. A similar situation may occur if the papillary muscle is damaged by cardiac infarction.

## DIASTOLIC MURMURS

**Functional diastolic murmurs—**

1. *Mitral*—Due to increased flow across mitral valve—(i) Left-to-right shunts (VSD, PDA), gross mitral incompetence, hyperkinetic state, e.g., thyrotoxicosis. Shorter than murmur of organic MS, no presystolic component and usually starts with $S_3$ (ii) Austin Flint murmur.

2. *Tricuspid*—(i) Due to increased flow across tricuspid valve—ASD, partial or total anomalous pulmonary venous drainage, MR, TR, Ebstein's anomaly, severe anaemia, hyperthyroidism, pulmonary hypertension and cor pulmonale. (ii) With gross pulmonary incompetence (Austin Flint murmur on the right side).

3. *Pulmonary*—Graham Steell murmur due to pulmonary hypertension, e.g., in mitral stenosis.

| *Aortic regurgitation murmur* | *Graham Steell murmur* |
|---|---|
| 1. Other evidences of rheumatic heart disease | 1. Evidence of pulmonary hypertension |
| 2 Systolic murmur of aortic stenosis heard | 2. No systolic murmur of AS |
| 3. Wide transmission of murmur | 3. Murmur not widely transmitted |
| 4. Murmur may be louder during expiration | 4. Murmur louder during inspiration |
| 5 $P_2$ not loud | 5. $P_2$ loud |
| 6. Peripheral signs of aortic insufficiency | 6 No peripheral signs |
| 7. Fluoroscopy—Pulmonary artery normal | 7. Large pulmonary artery |

**Organic diastolic murmurs—**

(a) *Early*: Regurgitation across semilunar valves—

1. *Aortic regurgitation*—Soft or loud early diastolic murmur, high pitched and blowing, best heard along left sternal border. Associated soft ejection systolic murmur.

absorption of fat (steatorrhoea) is the presenting symptom, the remaining features being dependent on the associated deficiencies which may occur in varying degrees as a result of inadequate absorption.

**Causes:** According to stage of fat absorption.

A **Defects of Digestion—**

1. *Mixing in stomach*—Gastric surgery.
2. *Hydrolysis of triglycerides*—Lipase deficiency due to pancreatic disease, old age, Zollinger-Ellison syndrome.
3 *Solubilisation by bile*—Biliary obstruction, liver disease with decreased bile salt excretion, biliary fistulae with bacterial overgrowth and deconjugation of bile salts. Neomycin or cholestyramine which precipitate bile salts from solution, ileal disease or resection causing increased bile salt loss.

B. **Defects of Absorption—**

1. MUCOSAL UPTAKE—
   (i) *Loss of absorption surface due to mucosal abnormality—*
      (a) *Diseases of small intestine:*
      Intestinal tuberculosis
      Crohn's disease
      Lymphomata
      Gluten-sensitive enteropathy (Coeliac disease)
      Tropical sprue
      Intestinal amyloidosis
      Mensenteric arterial insufficiency
      Whipple's disease
      Protein losing enteropathies
      (b) *Parasitic diseases:* Giardia lamblia, hookworm, strongyloides.
      (c) *Drugs:* Chemotherapeutic used in neoplasia, neomycin, cholestyramine, colchicine, PAS, phenindione.
      (d) *Collagen diseases:* Rheumatoid arthritis, systemic lupus, systemic sclerosis.
      (e) *Dermatitis herpetiformis.*
      (f) *Intestinal resection* (short bowel syndrome).
      (g) *Radiation injury.*
   (ii) *Small intestinal resection.*
2. RE-ESTERIFICATION TO TRIGLYCERIDE—Addison's disease with low enzyme activity.
3. CHYLOMICRON FORMATION—Abetalipoproteinemia.
4. LYMPHATIC DRAINAGE—Intestinal lymphangiectasia.

by pressure on the jugular vein or by making the patient lie down flat. (d) It increases in inspiration when the venous return to the heart is increased. (e) It differs from murmur of PDA in lacking any machinery quality.

(ii) *Mammary souffle*—Continuous high pitched murmur with diastolic accentuation may be heard in last trimester of pregnancy and for 4-6 weeks in the post-partum period. Usual site along left sternal border. Firm pressure with the stethoscope or with the finger lateral to the stethoscope, where the murmur is heard, gently obliterates it. May disappear when patient sits up.

**(B) Pathological—**

(i) Anomalous pulmonary venous return. (ii) Bronchial artery dilatation associated with pulmonary atresia.

## 4. CONGENITAL HEART DISEASE

**Etiology :**

(1) *Sex—Females* : ASD, PDA, more common. *Males* : Coarctation, transposition of great vessels, aortic arch disease.

(2) *Causation*—Possible factors are—(i) *Infection*—early in pregnancy, e.g., rubella. (ii) *Genetic factors*—e.g., same type of defect in more than one member of the family (iii) *Hypoxia*—if prolonged may predispose to persistence of the ductus and of foramen ovale. (iv) *Miscellaneous factors*—X-ray irradiation of mother during early pregnancy, toxaemia of pregnancy, vitamin deficiency, drugs such as thalidomide, corticosteroids.

**Classification :**

**I. Without intracardiac shunt (Acyanotic)**

**Dextrocardia**—means that the heart lies within the right thorax. Two types : (a) *Isolated dextrocardia*—due to incomplete rotation of the heart around its long axis. The left chambers lie to the left and anteriorly, the right chambers to the right and posteriorly. (b) *True dextrocardia*—with mirror-like transposition of the heart. There is a similar mirror-type transposition of the other viscera (situs inversus). Usually no other congenital cardiovascular defects Mirror-image X-ray picture. E C G.—mirror image of normal pattern.

**Coarctation of aorta**—(1) Systolic murmur—(a) Aortic due to dilatation of aorta. (b) Of coarctation between the scapulae.

5 *Metabolic/endocrine*—Hypothyroidism, hypoglycemia, uremia (and chronic dialysis), liver failure, porphyria, Whipple's disease, deficiencies of B1, B2, B12, folic acid.
6 *Multiple sclerosis.*
7 *Head injury*—including repeated minor trauma as in 'punch-drunk' syndrome.
8. *Normal pressure hydrocephalus.*

**Diplopia:**

1. *Monoocular*—In disease of the eye and hysteria.
2 *Temporary*—Myasthenia gravis, vascular disease affecting brain stem, migraine, post-concussion, acute alcoholism, fever, toxic states. States of nervous tension.
3 *Long-lasting* (usually)—Encephalitis, meningitis, head injury, tumors, subarachnoid hemorrhage, hypertensive encephalopathy, Wernicke's encephalopathy, abscess of brain or cerebellum, cavernous sinus thrombosis, botulism.
4 *Gradually worsening diplopia*—Compression from aneurysm, pituitary tumor, meningovascular syphilis, tuberculous meningitis, post-nasal carcinoma or tumor at base of skull.
5 *Very slowly progressive*—Ocular myopathy, thyrotoxic ophthalmoplegia. Lesions in the orbit such as arteriovenous fistula in cavernous sinus, orbital tumor.

**Dyspnoea:**

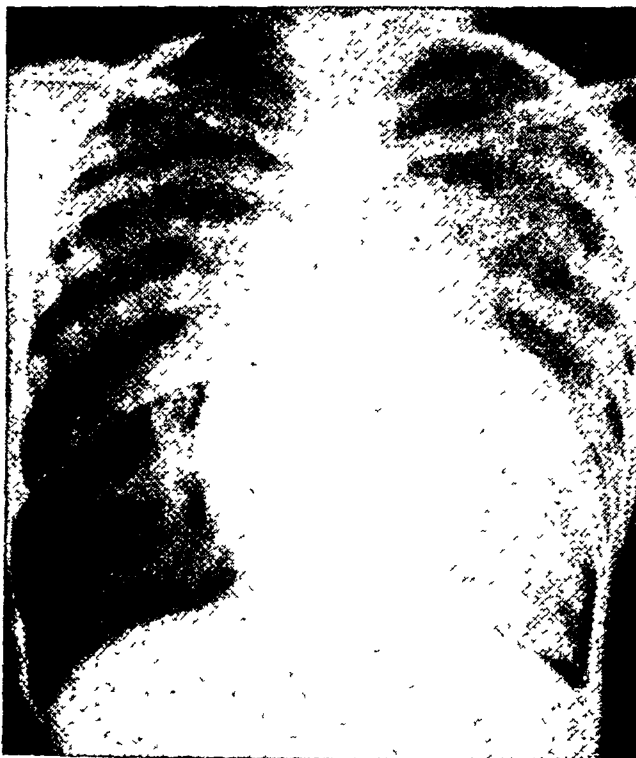
1 *Mechanical impairment of ventilation*—(a) Muscular weakness as in poliomyelitis or myasthenia. (b) Skeletal fixation, as from marked chestal deformity or spondylitis. (c) Hydrothorax, pneumothorax (d) Ascites or marked abdominal distension due to other causes (e) Tracheal or bronchial obstruction.
2 *Impairment of pulmonary distensibility*—(a) Pulmonary congestion. (b) Pulmonary fibrosis.
3 *Pulmonary insufficiency* (inadequately functioning alveolar tissue)—(a) Emphysema (b) Extensive inflammatory disease of pulmonary parenchyma.
4 *Inadequate delivery of oxygen to tissues*—(a) High altitude (b) Anemia (c) Cardiac failure
5 *Hyperventilation of central type.* as from acidosis—(a) Nephritic. (b) Diabetic.
6 *Psychic.*

**Erythema nodosum:**

1. Rheumatic fever.
2. Streptococcal infections.



Radiograph of chest in coarctation of aorta to show notching of the ribs posteriorly (arrows) Note the false aortic knuckle due to dilatation of left subclavian artery and LV enargement (For causes of rib notching see Ch 14 19)



Total anomalous pulmonary venous drainange 'Figure-of-eight', 'snow man' or 'cottage-loaf appearance

2 *Gastrointestinal fermentation*—(a) Faulty diet containing inadequately cooked starch or cellulose. (b) Gastrointestinal stasis—Constipation, after vagotomy, intestinal strictures (c) Intestinal hurry—Diarrhoea, cathartics. (d) Deficiency of digestive enzymes (e) Malabsorption states (f) Abnormal bacterial flora—e g. from use of broad spectrum antibiotics.

3 *Mechanical obstruction*—to passage of food and gas—Cascade stomach, intestinal obstruction.

**Gynecomastia :**

1 **Physiological causes—**

(a) Neonatal. (b) Pubertal. (c) Senile.

2 **Pathological causes—**

(a) *Increased oestrogen production*—Cirrhosis of liver, thyrotoxicosis, Leydig cell tumors and adrenal carcinomas Carcinoma of bronchus and other tumors (from secretion of human chorionic gonadotrophin).

(b) *Decreased androgen production* (Hypogonadism)—(i) Hypergonadotrophic—Klinefelter's syndrome, castration, orchitis (ii) Hypogonadotrophic—Isolated or part of panhypopituitarism

(c) *Androgen insensitivity* (Testicular feminization).

(d) *'Refeeding' gynecomastia*—due to resumption of gonadotrophin production.

(e) *Miscellaneous*—Leprosy, paraplegia, generalised skin disease, ulcerative colitis, congestive heart failure, hypertrophic pulmonary osteoarthropathy, rheumatoid arthritis, Hodgkin's disease, myotonia dystrophica, leukemia, chronic renal dialysis. Familial.

3 **Pharmacological—**

(a) *Oestrogen therapy*

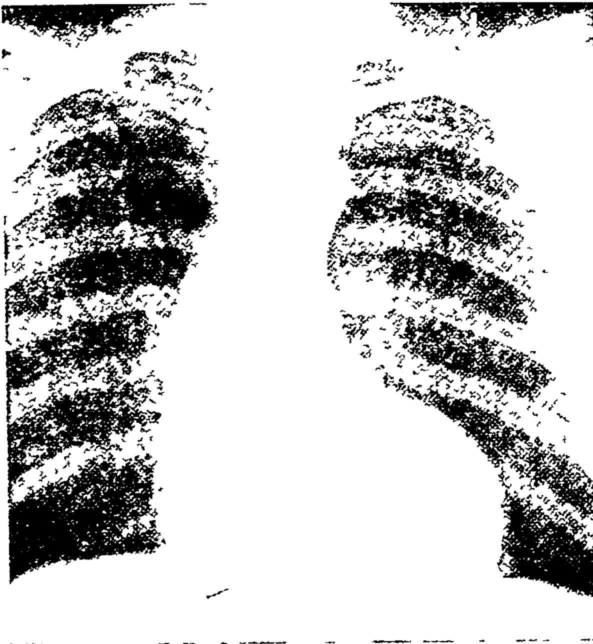
(b) *Androgens.*

(c) *Digitalis, tetrahydrocannabinol, and griseofulvin*—bind to oestrogen receptors.

(d) *Anticancer drugs*—especially alkylating agents (testicular damage).

(e) *Anti-androgens*—including cyproterone acetate, spironolactone and cimetidine.

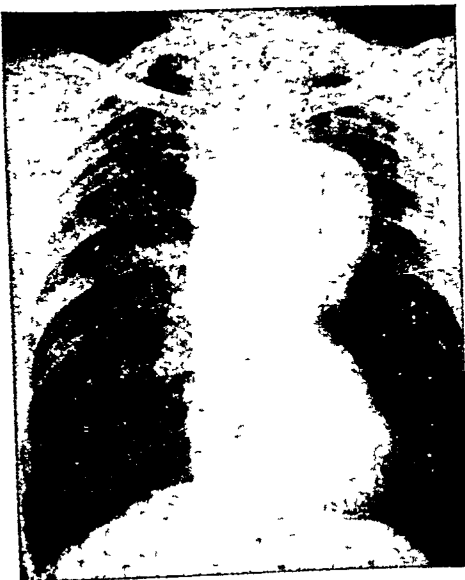
(f) *Other drugs*—Phenothiazines reserpine, tricyclics, and methyldopa. (mechanism unknown).



Aortic stenosis Poststenotic dilatation of the ascending aorta seen at the right heart border. Slight enlargement of the left ventricle

Causes of enlargement of aortic shadow—

1. Unfolding, atherosclerosis
2 Hypertension
3 AI, AS
4 Aortic aneurysm (including dissecting)



Aneurysm of descending aorta. Mediastinal shadows may be due to

1 Hilar and mediastinal lymphadenopathy.
2 Aortic aneurysms
3 Neurogenic tumors arising in intercostal nerves or in sympathetic nervous system
4 Bronchogenic and foregut cysts
5 Paravertebral abscess
6 Intrathoracic goitre
7 Teratoma or dermoid
8 Pericardial (spring water) cyst
9 Hiatus hernia

5 *Phrenic nerve paralysis*—In rare cases, if hiccough tends to exhaust the patient, phrenic nerve block by paravertebral injection of 3-5 cervical roots, or nerve crush.

**Hoarseness of voice:**

1. *Inflammation of laynx*—(a) Acute—Infection of larynx, acute epiglossitis, laryngotracheobronchitis, (b) Chronic—Nonspecific, polypoid laryngitis, vocal nodules.
2. *Chronic granulomas*—Tuberculosis, syphilis
3. *Endocrine dysfunction*—Hypothyroidism.
4. *Mechanical interference with function*—Injury to larynx, tumors benign or malignant.
5. *Functional disorders*—Functional dysphonia.
6. *Laryngeal paralysis*—(a) *Central* (intracranial) causes—bulbar lesions, tumors or vascular lesions. (b) *Peripheral* (in neck or thorax) causes—stretching, compression or interruption of the recurrent nerve, usually the left, e g aneurysm of aorta, cardiac enlargement, achalasia, anthracosilicosis, bronchogenic carcinoma, carcinoma of oesophagus, thyroid or trachea. Trauma following thyroidectomy. Toxic neuritis—lead, arsenic, alcohol, measles, influenza, diphtheria

**Horner's syndrome:** According to site of lesion.

1. Brain stem—Tumor, vascular lesions.
2. Spinal cord—Syringomyelia, tumor.
3. Spinal roots ($T_1$, $T_2$)—Injury.
4. Carotid artery—Thrombosis
5. Sympathetic chain—Apical lung carcinoma, glands

**Hypersomnia** (Attacks of drowsiness or sleep) :

1. Idiopathic narcolepsy
2. Symptomatic narcolepsy—Lesions in region of hypothalamus e g increased intracranial pressure, encephalitis, brain injuries, multiple sclerosis.
3. Hysteria
4. Parasomnia—in diabetic ketoacidosis, uremia, portal systemic encephalopathy, or overdosage with sedative drugs.
5. Klein-Levin syndrome—Periodic attacks of hypersomnia with excessive hunger.
6. Miscellaneous—Hypopituitarism, hypothyroidism, severe anemia, debilitating illness, anxiety neurosis.

**Ventricular septal defect**—Most common form of congenital abnormality. (1) Systolic thrill over 3rd or 4th interspace to left of sternum. (2) Harsh pansystolic murmur best heard in same area. (3) Both $A_2$ and $P_2$ may be audible, the pulmonary element accentuated in those with pulmonary hypertension. (4) Fluoroscopy—May be normal or prominent pulmonary conus, pulmonary plethora, enlargement of both ventricles. The left ventricle hypertrophies as a result of strain from the shunt and increased return of blood from lungs. The right ventricle hypertrophies due to extra volume of blood received through the septal defect. (5) Intracardiac catheterization—Increased $O_2$ content in right ventricle compared to right auricle. Catheter may go through the defect from right to left ventricle.

**Persistent ductus arteriosus**—(1) Usually double machinery (Gibson murmur) or "train-in-tunnel" murmur. It is crescendo to peak at or slightly before $S_2$, then decrescendo to beyond $S_2$. With development of pulmonary hypertension first the diastolic murmur disappears, then the systolic murmur shortens until only a short ejection murmur persists. A short mitral diastolic murmur produced by an increased blood flow through the mitral valve is common. (2) Systolic thrill over same area. (3) $P_2$ accentuated. (4) Rectangular area of dullness in 2nd and 3rd left interspace (Gerhardt's dullness). (5) Peripheral signs as in free aortic regurgitation. (6) No cyanosis or clubbing. (7) Hilar dance. (8) Cardiac catheterization—The catheter is often seen to pass through the ductus arteriosus into the aorta. Increased $O_2$ content in pulmonary artery as compared to right auricle and ventricle. (9) Angiocardiography—may demonstrate the defect. (10) E.C.G.—normal, or some degree of left ventricular hypertrophy.

## III. Right-to-left shunt (Cyanotic)

1. COMMUNICATION BETWEEN THE TWO SIDES OF THE HEART AND GREAT VESSELS :

**Eisenmenger's syndrome**—Pulmonary hypertension with central cyanosis. Congenital anomalies which permit communication between venous and arterial circulations may be A.S.D, P.D.A. or V.S.D. (Eisenmenger's complex). (i) Prominent venous 'a' waves in neck. (ii) Pulmonary artery palpable in second interspace. (iii) Pulmonary systolic murmur faint or absent. (iv) Systolic ejection click. (v) Pulmonary element of second sound loud. (vi) Diastolic murmur of relative pulmonary incompetence may be heard. (vii) E.C.G.—Right ventricular hypertrophy and strain. (viii) Radiology—gross dila-

7. Thrombosis of cervical veins and dural sinus.
8. Addison's disease, hypoparathyroidism.
9. Excessive vitamin A and chloramphenicol therapy in children.
10. Withdrawal of corticosteroid therapy in children

**Kyphoscoliosis :**

1. Congenital.
2. Idiopathic.
3. Rickets.
4. Rheumatoid arthritis.
5. Senile osteoporosis.
6. Neurological causes—Friedreich's ataxia, neurofibromatosis, syringomyelia, cerebral palsy, poliomyelitis.

**Loss of memory :**

1. Transient—following concussion.
2. Epilepsy (intermittent forgetfulness).
3. Intracranial tumor especially affecting frontal lobe, corpus callosum or temporal lobe.
4. Multiple sclerosis.
5. General paralysis and meningo-vascular syphilis.
6. Vitamin $B_{12}$ deficiency.
7. Vitamin $B_1$ deficiency with or without Wernicke's encephalopathy, Korsakow's psychosis.
8. Pellagra.
9. Hypothyroidism.
10. Huntington's chorea.
11. Anticonvulsant and sedative drugs.
12. Electro-convulsive therapy.
13. Alcoholism.
14. Senile cerebral atrophy.
15. Hysterical or psychopathic.
16. Rare diseases—Cerebral lipoidoses, gargoylism, Jakob-Creutzfied disease.

**Lump in right iliac fossa :**

1. Appendicular abscess.
2. Hypertrophic tuberculosis.
3. Carcinoma of caecum.
4. Amoeboma.
5. Regional enteritis.
6. Ectopic kidney.
7. Actinomycosis.
8. Intussusception.
9. Carcinoid.
10. Tubal pregnancy, ovarian tumor.
11. Schistosomiasis.

identified. Pulmonary stenosis well seen. Left ventricle may not be opacified at the time the right ventricle is.

| | *Fallot's* | *Eisenmenger's* |
|---|---|---|
| Cyanosis ... | At birth | After first few years |
| $P_2$ ... | Soft | Loud |
| Pul. diastolic murmur . | No | May be heard |
| Radiology ... | Oligaemic lungs Good pul. bay | Pul bay filled due to dilatation of pul. artery |

**Acyanotic Fallot**—The extent of the shunt depends on the degree of obstruction at the outflow tract of RV or at the pulmonary valve With only slight obstruction there is a bidirectional shunt with no cyanosis Moon face is common X-ray shows post-stenotic dilatation of pulmonary artery.

**Trilogy of Fallot**—PS with reversed interatrial shunt. The main differences from tetralogy are—Squatting is rare, cannon waves in neck common, RV heave is present, and the systolic murmur is loud and accompanied by a thrill

**Tricuspid atresia**—is the commonest lesion of clinical importance where central cyanosis is associated with left ventricular hypertrophy. Clubbing marked.

**Ebstein's malformation of tricuspid valve**—Blowing systolic murmur secondary to tricuspid incompetence. Early diastolic murmur over lower precordium common. E.C.G.—Right atrial enlargement and RBBB. X-ray—Diminished pulmonary vascularity.

**Severe pulmonary stenosis with intact ventricular septum**—Systolic thrill with loud harsh ejection systolic murmur in second left interspace with delayed $P_2$ which is diminished in intensity. E C.G.—RVH with strain pattern. X-ray—Post-stenotic dilatation of pulmonary artery.

3 MALFORMATION OF GREAT VESSEL ORIGIN :

**Transposition of great arteries (TGA)**—The aorta arises from RV and pulmonary artery relatively posteriorly from LV. Postnatal survival depends on compensating anomalies (such as ASD, VSD, or PDA) permitting admixture of oxygenated blood into systemic circulation. Cyanosis appears early and becomes progressively more severe. Harsh systolic murmur heard at left sternal border. E.C.G.—shows RVH and strain. X-ray—Ovoid or egg-shaped cardiac contour.

(e) *Due to weakness of ocular muscles*—Alcoholic polyneuritis, myasthenia gravis, botulism.

**Oedema:**

1. *Oedema of venous origin*—Pitting oedema. (a) Ingestion of excessive salt. (b) Steroids. (c) Premenstrual. (d) Cardiac oedema. (e) Renal oedema. (f) Portal obstruction. (g) Obstruction of inferior vena cava. (h) Anemia and hypoproteinemia (i) Beriberi. (j) Epidemic dropsy. (k) Pregnancy. (1) Miscellaneous—Old age, dermatomyositis, Raynaud's phenomenon, disseminated lupus.
2. *Lymphoedema*—Non-pitting oedema due to lymph stasis.
   (a) Congenital—Milroy's disease, oedema of congenital arteriovenous aneurysm, congenital neurofibromatosis.
   (b) Parasitic—filarial
   (c) Allergic—angioneurotic.
   (d) Chronic inflammatory—repeated attacks of erysipelas.
   (e) Post-traumatic—following fracture or soft-tissue injury.
   (f) Post-operative—e.g. excision of axillary or inguinal malignant lymph nodes.
   (g) Post-thrombophlebitic.
   (h) Neoplastic—blockage of lymphatics by malignant tissue e.g. cancer of breast.
   (i) Lymphoedema or erythrocyanosis frigida—in young women with stout build whose legs are abnormally fat
   (j) Idiopathic or spontaneous—more common in females, spontaneous puffiness in ankle or foot, unilateral in majority, gradually extending up the leg over months or years. Oedema pitting at first, later becomes non-pitting.

**Palmar erythema:**

A. *Physiological*—Pregnancy

B *Pathological*—

1. Liver disease—Viral hepatitis, cirrhosis.
2 Rheumatoid arthritis, SLE.
3. Polycythemia.
4. Beriberi.
5. Mitral incompetence.
6 Diabetes mellitus.
7. Skin diseases—Tinea, eczematoid dermatitis, psoriasis, pityriasis rubra pilaris.

**Palpitation:**

1. *Cardiac disease*—Extrasystoles, paroxysmal tachycardia, atrial flutter or fibrillation, heart block, hypertension and

excludes diagnosis of truncus arteriosus. In pulmonary stenosis second sound may be split but pulmonary element is faint.

7. *Murmurs*—(a) *Pansystolic*—In V.S D. along left sternal border in fourth or fifth space. Pansystolic murmur with other signs of A.S.D. suggests septum primum defect (b) *Midsystolic*—Pulmonary stenosis, pulmonary hypertension, congenital aortic stenosis. (c) *Early diastolic*—Pulmonary incompetence secondary to pulmonary hypertension, aortic incompetence often in association with coarctation of aorta, or bicuspid aortic valve, medionecrosis of aorta and in association with high ventricular septal defect (d) *Continuous*—P.D.A., aorto-pulmonary septal defect as result of congenitally weak sinus of Valsalva, in cases of coronary arteriovenous fistula, or pulmonary AV fistula. Continuous murmur on either side of sternum can also occur in congenital pulmonary atresia. (e) *No murmur*—in a child with central cyanosis and enlarged heart suggests transposition of great vessels.

8. *Pulse*—(a) *Arterial*—Collapsing pulse in P.D.A., aorto-pulmonary defect or the rare aortic incompetence. Femoral pulse delayed and weak or absent in coarctation. (b) *Venous*—prominent 'a' waves in neck in pulmonary stenosis and pulmonary hypertension.

**II. Investigations:**

1. *Electrocardiogram*—(i) Right axis deviation and RV enlargement in most congenital cardiac lesions in childhood and adult life (ii) Left axis deviation and LV enlargement in tricuspid atresia (iii) Arrhythmias—(a) WPW syndrome—especially in Ebstein's anomaly. (b) A-V block—common in corrected transposition of great vessels. May occur with VSD. (c) Arrhythmias uncommon in cyanotic CHD except in Ebstein's malformation (atrial tachycardia and atrial flutter).

2. *Chest roentgenogram*—(a) *Plethoric lung fields*—(i) Non-cyanotic—A.S.D., V.S D , P D.A. (ii) Cyanotic—Transposition of great vessels, truncus arteriosus, total anomalous pulmonary venous drainage or single atrium, tricuspid atresia with pulmonary stenosis, single ventricle (b) *Oligemic lung fields*—P.S., Fallot's tetralogy, Ebstein's anomaly. (c) *Conspicuous pulsation of pulmonary arteries* (hilar dance)—A.S D., to lesser extent P.D.A. and V.S.D. (d) *Diminished pulsation of heart* (quiet heart)—Ebstein's anomaly. (e) *Typical cardiac silhouettes*—(i) Boot-shaped heart in tetralogy of Fallot (ii) Egg-on-a-string appearance in complete transposition of vessels. (iii) Cottage loaf—(figure of eight) appearance in total anomalous pulmonary venous drainage.

5. Parkinsonism.
6. Femoral or sciatic nerve palsy.

**Pes cavus:**

1. Idiopathic.
2. Spinocerebellar atrophy e.g. Friedreich's ataxia, peroneal muscular atrophy.
3. Spina bifida.
4. Myelodysplasia in lumbo-sacral region.
5. Sacral dermoid cyst with affection of cauda.
6. Cerebral palsy.
7. Poliomyelitis.

**Pigmentation of the skin:**

1. *Yellow pigmentation*—(a) Jaundice (b) Carotenemia—(no pigmentation of sclera and mucous membrane) results from excessive ingestion of foods rich in carotene such as carrots, oranges, squash, etc., lowered body metabolism e.g. myxoedema Simmond's disease and diminution of androgenic hormonal activity e g. the male castrate. (c) Administration of mepacrine. (d) Exposure to yellow industrial chemicals (e) Ingestion of picric acid or its absorption from ointments applied to open wounds (f) Diffuse xanthomatosis produces yellowish-orange type of skin discolouration.

2 *Hemoglobin pigmentation*—(a) Cyanosis. (b) Polycythemia. (c) Carbon monoxide poisoning (carboxyhemoglobinuria). (d) Methemoglobinemia and sulphemoglobinemia

3 *Melanin pigmentation*—

(a) External or physical causes—Exposure to sunlight, ultraviolet rays or Roentgen rays, severe pruritus sometimes.

(b) Internal or systemic causes—(i) Of nutritional origin—pellagra, vitamin C-deficiency, deficiency of vitamin A. (ii) Hormonal—Addison's disease, Simmond's disease, pregnancy, adrenogenital syndrome, exophthalmic goitre, Albright's syndrome, ovarian cyst. (iii) Biochemical disorders—hemochromatosis, melanosis, hematoporphynuria, diabetes mellitus, liver disease. (iv) Chemical agents and drugs—gold, silver, arsenic, lead, mustard gas (v) Systemic infections—malaria, kala-azar, syphilis, leprosy, subacute bacterial endocarditis. (vi) Skin diseases—Neurofibromatosis, urticaria pigmentosa, lupus erythematosus, exfoliative dermatitis. (vii) Peritoneal lesions—T.B. peritonitis, peritoneal carcinomatosis. (viii) Blood diseases—Pernicious anemia, Hodgkin's disease, Gaucher's disease. (ix) Miscellaneous—

*Tetralogy of Fallot*—Total correction with closure of VSD and relief of right ventricular outflow obstruction. Children under 5 who are severely disabled should be treated by two stage procedure—a systemic-pulmonary anastomosis, or infundibular resection and pulmonary valvotomy is performed first, followed at a later date by open heart surgery for total correction.

*Pulmonary stenosis*—Pulmonary valvotomy in cases which show increasing dyspnoea or cardiac failure or progressive enlargement of the heart. Pulmonary infundibular stenosis—part of the infundibular tract can be removed surgically.

*Transposition of the great arteries*—For simple TGA septostomy by Rashkind's procedure—An inflatable balloon catheter is introduced from the femoral vein via the vena cava and passed from RA across the atrial septum into LA. Once in LA it is inflated with contrast medium and jerked back to tear a hole in the septum.

## 5. VALVULAR HEART DISEASE

## MITRAL VALVE DISEASE

### Mitral Stenosis

**Causes:**

1. Rheumatic fever in majority. As a result of rheumatic endocarditis chordal fusion, leaflet thickening or commisural fusion develops giving rise to funnel-shaped deformity of the valve with button hole orifice.
2. Congenital. May be seen as parachute valve or commisural fusion.
3. Associated with A.S.D. (Lutembacher's syndrome).
4. Hurler's syndrome (Gargoylism).
5. Endomyocardial fibrosis (regurgitation more common).
6. Calcified mitral annulus in elderly.
7. Functional—due to partial obstruction of valve orifice—(a) Left atrial tumour usually myxoma. (b) Left atrial ball valve thrombus. (c) Cor triatrium. (d) HOCM with obstruction to left ventricular inflow.

**Symptoms:**

1. *No symptoms*—discovered during pregnancy, routine physical examination or supervening infective endocarditis. There are no symptoms until the valve area is reduced to 2.5 $cm^2$.

3. Horner's syndrome.
4. Tabes dorsalis.
5. Myasthenia gravis.
6. Ocular myopathy.
7. Periodic paralysis.

**Raynaud's syndrome:**

1 *Raynaud's disease*
2 *Collagen diseases*—Rheumatoid arthritis, Sjogren's syndrome, polyarteritis nodosa, dermatomyositis and polymyositis, systemic sclerosis
3 *Occlusive arterial disease*—Arterial embolism, thromboangiitis obliterans, subclavian compression in costoclavicular syndrome.
4. *Blood diseases*—Polycythemia vera, paroxysmal cold hemoglobinuria, high titre of cold agglutinins in blood, cryoglobulinemia in association with lymphoma or myeloma.
5. *Poisoning by ergot.*
6. *Syringomyelia.*
7 *Trauma* (occupational)—pneumatic drill operators, grinders, riveters.

**Spider naevi:**

1. Cirrhosis of liver.
2 Virus hepatitis (transient).
3. Pregnancy.
4 Normal individuals especially children (occasionally).
5. Rheumatoid arthritis.

**Splinter hemorrhages** (fingers) :

1. Subacute bacterial endocarditis.
2. Trichinosis.
3 Infectious mononucleosis.
4. Blood dyscrasias.
5. Cryoglobulinemia.
6. Mitral stenosis without infection (occasionally).
7. Trauma

**Sterile pyuria:**

1 Renal tuberculosis.
2. Drugs—Analgesic nephropathy, diuretics, jectofer
3 Renal calculus.
4. Urogenital infection treated with antibiotics.
5. No specific urethritis (NSU)—Probable infective agent Chlamydia trachomatis or trachoma inclusion conjunctivitis (TRIC) agent. Rare causes are descending upper urinary

'a' waves in jugular venous pulse in patients with pulmonary hypertension.

*Palpation*—1. Apex impulse normal, or brief tapping corresponding to the tap of the mitral 1st heart sound (closing snap). 2. Left parasternal heave due to RV hypertrophy. 3. Palpable second sound in second left space. 4. Presystolic and mid-diastolic thrill may be felt at the apex.

*Auscultation*—Four cardinal signs are:

1. *Loud 1st heart sound*—This results from two factors—(a) The high left atrial pressure keeps the mitral cusps open until the very end of diastole. (b) Fibrotic changes in the mitral valve leaflets alter them in such a way that they tense more abruptly with ventricular contraction. If the valve is heavily calcified the first sound will not be accentuated.
2. *Presystolic murmur*—often a relatively early sign, usually disappears with onset of atrial fibrillation. The murmur of mitral stenosis is localised to the apex, best heard on expiration, after exercise and with the patient turned on to the left side.

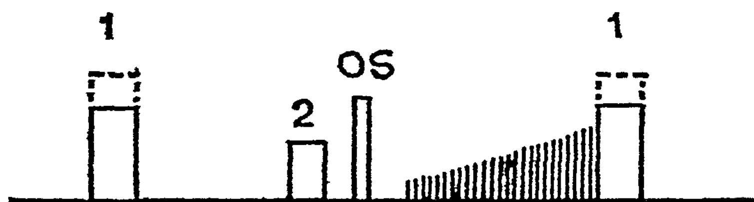



Fig. 2 22 Mid-and late diastolic (presystolic) murmur of mitral stenosis with accentuated first heart sound at the apex and opening snap

3. *Mitral opening snap*—heard best at apex shortly after 2nd sound. Shorter the interval between 2nd sound and opening snap (2-OS interval) tighter the stenosis. (The higher left atrial pressure causes earlier diastolic opening of the mitral valve). It is caused by the sudden flapping back of the mitral cusps when the rapidly falling left ventricular pressure falls below the left atrial pressure. The snap is soft or absent if the valve is rigid or calcified.
4. *Apical mid-diastolic murmur*—occurs after the opening snap and is caused by turbulent flow from atrium to ventricle through the stenosed mitral valve.

*Signs of increasing stenosis*—(i) Diastolic murmur becomes longer. (ii) Opening snap moves closer to aortic component of second sound. (iii) Loud $P_2$ and (iv) Graham Steell murmur

(b) Peripheral—Stimulation of pharynx and fauces, severe trauma to testicle, muscles or joints. Primary shock, Meniere's disease, sea-sickness and air-sickness.

2 *Central*—
(a) Special senses—Offensive smells, tastes, repulsive sights
(b) Brain—Concussion, cerebral tumor, or abscess, meningitis, cerebral hemorrhage, middle-ear disease, Meniere's disease, migraine, epilepsy, sea, train, car or air-sickness, radiation sickness.
(c) Spinal cord—Gastric crisis of tabes dorsalis.

3. *Toxic*—Hepatic disease, uremia, acidosis, alkalosis, hypoglycemia, excessive dehydration, toxemia of pregnancy, cyclic vomiting of childhood. Drugs such as digitalis, emetine.

4 *Functional* or hysterical vomiting

*Treatment*—

(1) Of etiological factor—acidosis, intestinal obstruction, etc

(2) Symptomatic treatment—
(a) Nothing by mouth except pieces of ice to suck
(b) Chlorpromazine—25 to 50 mg. by mouth or intramuscularly, or trifluoperazine or promazine hydrochloride 10-25 mg by mouth, I.M or I.V.
(c) Intravenous glucose, with pyridoxine in cases of vomiting of pregnancy.
(d) Psychotherapy—may be of value if emesis appears to have a psychic basis.

**Weight loss:** (in an adult).

I EXOGENOUS CAUSES—

1. *Inadequate intake*
(i) Anorexia and starvation, dietary fads, perverted appetite, chronic alcoholism, drug therapy, antibiotics
(ii) Inability to swallow due to lesions of—(a) Tongue—paralysis, tumor, inflammation. (b) Palate—paralysis, tumors, inflammation, perforation (c) Pharynx—paralysis, tumors, inflammation. (d) Oesophagus—stenosis, tumors, achalasia, foreign body, etc.

2 *Inadequate absorption or utilisation*—Chronic diarrhoea, lack of enzymes or bile, lack of hydrochloric acid and pepsin, malabsorption syndrome, intestinal parasites.

3. *Excessive elimination or abnormal loss*—Diarrhoea, vomiting, fistulae, burns.

sode of pulmonary oedema without obvious precipitating cause. 4. Following embolisation. 5. Pulmonary oedema during pregnancy.

II. **Medical**—

1. *Prevention of recurrence of rheumatic fever*—especially in younger patients. Prophylactic oral penicillin V 250 mg b.d. or in patients who are unreliable in taking oral therapy Benzathine penicillin G 1 2 million units IM once a month. If patient is allergic to penicillin, erythromycin 250 mg daily by mouth.
2. *Prevention of infective endocarditis*—(Refer p. 168).
3. *Prevention of too rapid a ventricular rate*—Digitalis if—(i) Atrial fibrillation. (ii) Older patients who are still in sinus rhythm to prevent paroxysmal atrial fibrillation.
4. *Prevention of pulmonary venous congestion and pulmonary oedema*—Diuretics. Surgery in patients with severe stenosis.
5. *Prevention of embolism*—Long-term anticoagulant therapy may be considered in patients with chronic atrial fibrillation and in those without fibrillation who are not subjected to surgery.

## Mitral Regurgitation

**Causes:**

A ORGANIC MR·

*Common:*

1. Rheumatic fever.
2. Bacterial endocarditis.
3. Papillary muscle or chordae dysfunction (subvalvar MR) usually due to myocardial infarction.

*Uncommon·*

4. Hypertrophic obstructive cardiomyopathy.
5. Congenital—Associated with ostium primum defect.
6. Libman-Sacks syndrome in SLE.
7. Endomyocardial fibrosis.
8. Surgical trauma to stenotic mitral valve.

*Rare:*

9. Floppy valve syndrome—Mitral valve has redundant cusp tissue with elongated and unduly lax chordae e.g. Marfan's disease, pseudoxanthoma elasticum, ankylosing spondylitis, Ehlers-Danlos syndrome, atrial septal defect of secundum type.
10. Methysergide therapy.

tension, papilloedema, trauma and retinal detachment, arteritis; rarely in polycythemia vera, and subacute bacterial endocarditis. (b) From venous congestion—compression of chest and head especially in new-born infants.

4. *Subhyaloid hemorrhages*—Large hemorrhagic extravasations at the surface of the retina just beneath the inner membrane. Commonly found in subarachnoid hemorrhage; may be due to trauma to eye, malignant endocarditis, pyemia and septicemia.
5. *Thrombosis of central retinal vein*—Outline of disc lost and the large veins can be seen intermittently in the oedematous and hemorrhagic retina, as if a quantity of red paint had been splashed all over the retina.
6. *Embolism of central retinal artery*—Retina in the surrounding area becomes white, and because the choroid shows through the thinnest part of the retina, the macular region remains coloured yellow, orange or red—"cherry red spot".
7. *Pulsation of retinal vessels*—(a) Arterial—In aortic regurgitation and in glaucoma, the arteries are seen to fill with each systole and collapse with diastole (b) Venous—Veins of the retina may be dilated and tortuous to an extreme degree in sickle-cell anemia In polycythemia, the vessels are engorged, tortuous, and irregular; veins are dark purple, and retina deeply coloured. Papilloedema, and embolism of central retinal artery may occur.
8. *Takayasu's disease*—Fragmentation of blood stream in the retinal vessels may be visible particularly when the patient is standing. Later ocular manifestations are atrophy of the retina and iris with neovascularisation, the formation of retinal and microaneurysms and pericapillary arteriovenous anastomoses and the rapid development of cataract.
9. *Degenerations*—(i) Retinitis pigmentosa in Laurence-Moon-Biedl syndrome (ii) In amaurotic family idiocy—pale fundus with cherry red spot in macula; nerve head pale and atrophied. Similar picture may be seeen in Niemann-Pick disease
10. *Septic retinitis*—Small, round, white patches (*Roth spots*) often associated with small hemorrhages near the disc, may be observed in subacute bacterial endocarditis The hemorrhages like those in anemia and leukemia, may have a white centre.

mur (ii) *With posterior chordal rupture*—the posterior mitral leaflet balloons into the left atrium during ventricular systole, and the regurgitant jet is anteriorly directed. The murmur is therefore prominent in the aortic area, simulating aortic stenosis.

**Mitral valve prolapse**—This is a condition of myxomatous degeneration of valve leaflets usually congenital in origin.

*Symptoms*—vary from none to those of nonspecific chest pain, palpitation, tiredness and dizziness.

*Signs*—vary according to degree of prolapse—(1) Mid-systolic click only. (2) Mid-systolic click with late systolic murmur. (3) Pansystolic murmur with severe mitral incompetence.

*E C.G.*—may show T wave inversion in inferior surface leads, and ventricular extrasystoles.

*Complications*—1. Ventricular arrhythmia due to disturbance of left ventricular muscle in relation to the papillary muscle of the prolapsing valve 2 Infective endocarditis may lead to severe mitral regurgitation.

*Differential diagnosis*—Prolapse of the mitral valve with the same signs may occur with (a) rheumatic heart disease, (b) ischaemic heart disease, (c) Marfan's syndrome and (d) A S.D

**Investigations:**

*X-ray*—In severe cases LA (may be aneurysmal) and LV enlargement, later RV enlargement. Systolic expansion of left atrium on barium swallow. If LA is disproportionately small in comparison with the large size of LV or degree of mitral regurgitation, papillary muscle dysfunction or ruptured chordae likely. With high LA pressure Kerley B lines.

*E.C.G.*—P mitrale. In severe cases LVH.

*Echocardiography*—Rupture of chordae tendinae of mitral valve as a cause of MR may be suspected from an abnormally great separation of anterior and posterior cusp echoes, and from an abnormally large range of movement of anterior leaflet.

*Angiocardiography*—The presence of mitral regurgitation can be confirmed by angiocardiography with the aid of left heart catheterization There is a gross correlation between the relative amount of retrograde filling of the left atrium with contrast material and severity of mitral regurgitation.

**Complications**—Same as MS except incidence of embolism is less and that of SBE greater.

**Differential Diagnosis**—See pp 135-137.

visual activity. Causes—(a) Infections—(i) Local—retinitis, periostitis. (ii) General—Syphilis, toxoplasmosis, typhoid, mumps, measles, smallpox. (b) Toxins (toxic amblyopia)—tobacco, methyl alcohol, contraceptive pill, lead, carbon disulphide, thallium, quinine. (c) Demyelinating diseases—e.g. disseminated sclerosis, Devic's disease. (d) Metabolic disorders—Diabetes, vitamin $B_{12}$ deficiency. (e) Hereditary degenerative diseases—Friedreich's ataxia. (f) Giant-cell arteritis.

3. *Optic atrophy*—(a) Primary—optic nerve pale but sharply outlined (Disc difficult to find). (b) Secondary—fuzzy appearance of nerve head. (Disc appears like a new tennis ball).

   Optic atrophy is primary when it has been preceded by papilloedema, secondary when it follows papilloedema (For diagnosis and causes see p. 953).
4. *Tumors of optic nerve head*—Neoplastic, inflammatory such as gumma or tubercle.
5. *Congenital anomalies*—Vascular, anomalies of pigmentation.

## 19. SOME IMPORTANT LABORATORY VALUES

### Hematology

**Erythrocytes**—

| | | |
|---|---|---|
| Children | 4.5-5.1 million/c mm. | $4.5\text{-}5.1 \times 10^{12}/1$ |
| Males | 4.6-6.2 million/c mm | $4.6\text{-}6.2 \times 10^{12}/1$ |
| Females | 4.2-5.4 million/c. mm | $4.2\text{-}5.4 \times 10^{12}/1$ |

*Erythrocytosis*—See causes of polycythemia p 373.

**Reticulocytes**—25,000-75,000/c.mm $25\text{-}75 \times 10^{9}/1$ (0.5-1.5% of erythrocytes).

*Increased*—(i) Response to Vitamin $B_{12}$ therapy in primary macrocytic anemia, (ii) congenital hemolytic jaundice, (iii) sickle cell anemia, (iv) slight increase in leukemia, myelophthisic anemia, lead and mercury poisoning.

*Decreased*—Idiopathic and symptomatic aplastic anemias

**Hemoglobin:** Normal levels—

| *Age* | *Hb level* (g/dl) |
|---|---|
| Birth | 14.5-19.5 |
| 8-9 weeks | 9.5-12.5 |
| 1 yr-puberty | 10.5-13.0 |
| Puberty | 11.5-15.0 |
| Adult female | 11.5-16.5 |
| Adult male | 13.5-18.0 |

*Auscultation*—

1. *Diastolic murmur*—High-pitched decrescendo murmur, maximal in early diastole soft and blowing with or after the second sound or masking the sound completely, maximum audibility over midsternum and to the left, transmission to the apex, best heard in held expiration with patient leaning forward. In a few patients the diastolic murmur has a rough or musical or sea-gull quality. (A diastolic thrill may be felt along the left sternal border in such cases). If the murmur is best heard to the right of sternum, suspect dilatation of ascending aorta as in Marfan's syndrome, dissection of aorta or syphilis. A musical murmur may extend almost throughout diastole.




Fig 2 24 Early decrescendo murmur of aortic incompetence.

2. *Systolic ejection murmur*—due to increased stroke volume of left ventricle.
3. *Austin Flint murmur*—An apical low-pitched diastolic murmur may occur with severe AR. It is due to vibrations set up in anterior mitral leaflet as it oscillates between the antegrade stream of blood from left atrium and retrograde stream from aorta. It must be differentiated from an organic mitral stenotic murmur (see table).
4. *First sound at apex*—often soft or early because of premature closure of mitral valve.
5. *Second sound at base*—single in severe AR because aortic component is absent.
6. *Third sound*—and apical pansystolic murmur of MR can commonly be heard as the LV dilates.

| | *A.R. with Austin Flint murmur* | *A.R with associated mitral stenosis* |
|---|---|---|
| Sex | More frequent in males | More frequent in females |
| Haemoptysis | Almost never | Strong evidence for mitral stenosis |
| Rhythm | Sinus | A. fibrillation common |
| Mitral 1st sound | Usually faint | Usually loud |

is 180-250 gm., in steatorrhoea it is more than 300 gm. (c) Estimation of faecal fat—Normal excretion per day of fat on a mixed diet is 5 to 7 gm., more than this is evidence of malabsorption.

2. *Hemogram*—Defective iron absorption leads to microcytic anaemia, and $B_{12}$ or folic acid absorption to macrocytic anaemia.
3. *Glucose tolerance test*—Helpful in differentiating pancreatic diarrhoea from idiopathic steatorrhoea. In the former curve is normal or diabetic type, in latter it is usually flat.
4. *Serum proteins and electrolytes.*
5. *Xylose excretion test*—Following a 25 g. oral dose of d-xylose at least 5 g. should be excreted in the urine in next 5 hours. In malabsorption usually $< 2$ g. is excreted.
6. Serum levels of iron, $B_{12}$ and folic acid.
7. Tests for ability to absorp $B_{12}$ (Schilling test) and folic acid (FIGLU test).
8. *Lundh test meal*—Decreased enzyme output into the duodenum after a standard fat load in pancreatic disease. (Pancreatic juice also low in bicarbonate).

B. RADIOLOGICAL—

1. *Barium meal*—(i) *Delayed transit time.* (ii) *Abnormal small intestinal pattern*—(a) Smooth appearance of margins of barium filled intestine. (b) Clumping of barium or transformation of normal feathery appearance to a ladder pattern resembling stack of coins. (iii) *Radiological anatomical abnormality*—in stagnant loop syndrome, small intestinal resection, Crohn's disease, systemic sclerosis.
2. *X-ray of chest*—for evidence of tuberculosis.
3. *X-ray of abdomen (plain)*—for pancreatic calcification.
4. *Lymphangiography*—Abnormalities of retroperitoneal lymphatics in intestinal lymphangiectasia.

C. PERORAL JEJUNAL BIOPSY—The mucosa is flattened with reduction of absorptive surface. The villi are short and blunted and the surface epithelium reduced to a low columnar type.

D. DIETARY TEST—In coeliac disease patient improves symtomatically as soon as gluten-free diet is commenced, relapsing when gluten is reintroduced into the diet.

**Management of idiopathic steatorrhoea:**

1. *Diet*—High protein, low fat. Dried milk products, extra meat. No fried foods. In the treatment of coeliac disease and idiopathic steatorrhoea, a glutten free diet should be prescribed. All food items containing wheat (or rye) which go

6. *Pistol shot sound*—over the femoral arteries (Traube's sign).
7. *Duroziez's murmur*—'To and fro' murmur over femoral arteries caused by a considerable increase in both forward and backward flow in the vessel.
8. *Retinal arteriolar pulsation.*

**Investigations:**

*E.C.G.*—Left ventricular hypertrophy, with diastolic overload pattern in severe regurgitation.

*Chest x-ray*—Enlargement of the left ventricle, with 'duck-back' shape of left border. Ascending aorta shows uniform enlargement. Pulmonary venous congestion and pulmonary oedema if left ventricular failure or gross premature mitral valve closure.

*Phonocardiogram*—Diastolic murmur seen to start immediately after $A_2$ and presenting a diminuendo-shape after 2nd sound. A progressive decrease in duration of murmur may indicate progressive myocardial failure.

*Echocardiogram*—May be used to estimate intracavitary dimensions and myocardial contractility. Vibrations caused by the regurgitant stream may be seen on anterior mitral leaflet

*Cardiac catheterisation and Angiocardiography*—(i) To confirm presence of associated lesions of other cardiac valves. (ii) To assess LV function. (iii) To assess degree of AR (by aortography). (iv) To define the exact nature of the lesion in patients where AR may be caused by dissection or gross dilatation of ascending aorta.

**Differential Diagnosis:**

| 1. *Rheumatic AR* | 2. *Syphilitic AR* |
|---|---|
| *History:* | |
| More common before 30 | More common after 30 |
| History of rheumatic fever | History of syphilis |
| Duration may be long | Short duration or history |
| Angina pectoris rare | Angina pectoris common and earlier |
| *Examination:* | |
| Precordium may be prominent | No precordial prominence |
| Murmur best heard in third left space, usually soft and low pitched and conducted better down left side | Murmur heard best over 2nd right space, usually loud and harsh and conducted better down right side |

General—septicemia, infective endocarditis. (b) Toxic neutrophilia—(i) Endogenous intoxications—uremia, eclampsia, gout, diabetic acidosis, burns. (ii) Drugs and poisons—Digitalis, mercury, lead, adrenaline, potassium chlorate, salicylates. (c) Posthemorrhagic—especially hemorrhage into serous cavities—peritoneum, pleura, joints, subdural (d) Associated with tissue destruction—myocardial infarction, post-operative, cancer of liver, gastrointestinal tract or bone marrow; burns, after hemolysis of red cells.

LYMPHOCYTOSIS—

(1) Infants and young children.
(2) *Infections*—(a) Viral: Infectious mononucleosis, infective hepatitis, acute infectious lymphocytosis, mumps, rubella, cytomegalovirus infection, varicella. (b) Bacterial: Tuberculosis, pertussis, brucellosis (c) Protozoal: Toxoplasmosis
(3) *Lymphoproliferative disorders*—Chronic lymphocytic leukemia, Waldenstrom's macroglobulinaemia.
(4) *Miscellaneous*—Drug reactions, hyperthyroidism, myasthenia gravis, convalescence from any infection.
(5) Occasionally atrial myxoma.
(6) Malaria
(7) Drugs—Hydralazine, procainamide

EOSINOPHILIA

*Eosinophil counts upto 1 5 × 10⁹/1*

| *Common* | *Rare* |
|---|---|
| Allergic rhinitis | Inflammatory bowel disease |
| Hay fever | Some infectious diseases |
| Extrinsic asthma | Neoplasms |
| Parasitic diseases | Skin diseases: Pemphigus, pemphigoid, dermatitis herpetiformis and psoriasis |
| Occupational lung disease | |

*Eosinophil counts over 1.5 × 10⁹/1*

| *Common* | *Rare* |
|---|---|
| Drug reactions | Vasculitis and granulomatous diseases |
| Intrinsic asthma | Neoplasms |
| Parasitic diseases | Hypereosinophilic syndromes |
| Pulmonary eosinophilia (including tropical eosinophilia) | |

MONOCYTOSIS—(i) Certain bacterial infections—Tuberculosis, subacute bacterial endorcarditis, brucellosis, typhus, and rarely

## Aortic Stenosis

**Causes:**

I. **Valvar stenosis—**
   1. Congenital malformation (most common cause of isolated AS).
   2. Calcification of normal valve.
   3. Inflammatory fusion—Rheumatic fever (lesion is nearly always mixed stenosis and regurgitation).

II. **Subvalvar stenosis—**
   1. *Fixed type*—Due to fibrous ring, fibrous ring plus moderate muscular obstruction, or rarely anomalous insertion of mitral valve.
   2. *Hypertrophic type*—due to HOCM.

III **Supravalvar stenosis—**
Due to ridge of fibrous tissue at upper border of sinuses of Valsalva.

**Symptoms:**

1 *No symptoms.* Most well compensated of valvular diseases.
2 *Angina pectoris*—Due to—(i) Increased oxygen demand by the hypertrophied myocardium. (ii) Shortening of diastole, the time when the coronary arteries fill, caused by prolonged ventricular ejection time. (iii) Squeezing effect on coronary arteries by high LV systolic pressure. (iv) Involvement of coronary ostia in the stenotic process.
3. *Syncope*—Syncopal spells beginning after onset of left ventricular failure are often brought on by little if any effort and are of grave significance.
4. *Dyspnoea*—on effort often first symptom. Orthopnoea and paroxysmal dyspnoea follow as result of left ventricular failure.
5. *Dizziness*—is most frequent when standing

**Signs:**

*Palpation:*

1. *Systolic thrill*—in second right interspace and also sometimes along the right cervical vessels.
2. *Cardiac impulse*—sustained and heaving in character.

*Auscultation:*

1. *Ejection systolic murmur*—in aortic area, rough or harsh beginning slightly after the first sound, rising to a peak in

POSITIVE LE CELLS IN BLOOD—

1. Systemic lupus erythematosus (70-80%).
2. Rheumatoid arthritis (10%) and occasionally other collagen diseases.
3. Active chronic lupoid hepatitis (10%).
4 Atrial myxoma occasionally.

HLA ANTIGENS: Commonly associated disorders—

1. Rheumatic diseases—Ankylosing spondylitis and related disorders, rheumatoid arthritis.
2. Neurologic diseases—Multiple sclerosis, myasthenia gravis, olivopontocerebellar ataxia.
3. Skin diseases—Psorisis, discoid lupus erythematosus, dermatitis herpetiformis, Bechet's disease
4 Endocrine diseases—Insulin-dependent diabetes mellitus, Grave's disease, subacute thyroiditis, Addison's disease, hypergonadotrophic hypogonadism, 21-hydroxylase deficiency.
5. Gastrointestinal diseases—Gluten-sensitive enteropathy, pernicious anemia, chronic active hepatitis, hemochromatosis.
6 Immunopathic diseases—Atopy, complement deficiencies (C2, C4), SLE, Sjogren's disease.
7. Malignant diseases—Hodgkin's, acute lymphoblastic leukemia, acute myelogenous leukemia, nasopharyngeal carcinoma.
8. Occupational disease—Asbestosis.
9. Drug reactions—Hydralazine lupus

**Erythrocyte sedimentation rate (ESR) :**

| | *Adult males* | *Adult females* |
|---|---|---|
| Westergren | 3- 5 mm in 1 hour | 4- 7 mm. in 1 hr. |
| Wintrobe . | 0-10 mm. in 1 hour | 0-15 mm. in 1 hr. |

Normal values do not necessarily exclude disease.

*Increased*—(i) Physiological—pregnancy after the second month and menstruation. (ii) Infective disease—acute generalised and localised infections, chronic active infections like tuberculosis and rheumatic carditis. (iii) Ischemic disease—myocardial infarction (iv) Metabolic—e g. acute gout. (v) Traumatic—burns, fractures. (vi) Neoplastic—certain malignant tumors including Hodgkin's disease.

*Very rapid rates in*—(i) Kala-azar. (ii) Some cases of multiple myeloma. (iii) Cranial arteritis, leukemia. hemolytic anemia, chronic renal disease, sarcoidosis, systemic lupus erythematosus, ankylosing spondylitis.

*Apex cardiography*—Of value in demonstrating large 'a' waves which provide an index of severity.

*Cardiac catheterisation and angiocardiography*—of the left heart to measure pressure gradient across the valve. With significant obstruction, the ventricular pressure will exceed the pressure in the aorta by more than 50 mm. Hg. Left ventricular cine angiography of value for assessing LV function and competence of mitral valve and when site of stenosis is in doubt or in cases of sub- and supra-valvar AS. It should be combined with selective coronary angiography, particularly if history of anginal pain.

**Subvalvar stenosis:**

1. Absence of aortic ejection click with no calcification of aortic valve.
2. Diastolic murmur due to AR more common.
3. Mid-diastolic murmur at apex.
4. Heart size tends to be larger.
5. Ascending aorta usually not dilated.

**Supravalvar stenosis:**

1. Characteristic facies with physical and mental retardation.
2. Systolic B.P. usually higher in right arm than in left arm due to stenosis of one or more branches of the aortic arch.
3. Absence of aortic ejection click.
4. No post-stenotic dilatation of aorta.

**Differential Diagnosis**—(a) See differential diagnosis of systolic murmur. (b) HOCM.

| Clinical signs | HOCM (IHSS) | Aortic valvar stenosis |
|---|---|---|
| Double apex impulse | Common | Less common |
| Presystolic gallop | Common | Less common |
| Single 2nd sound | Less common | Common |
| Paradoxical splitting of 2nd sound | Common | Less common |
| Systolic thrill | Not common | Common |
| Systolic murmur | Along left sternal border and at apex | 2nd right interspace radiating to neck |
| Diastolic murmur of AR | Rare | Common |
| Carotid pulse | Visible, rapid upstroke | Invisible, slow upstroke |
| Valsalva manoeuvre | Murmur louder | Murmur softer |

HYPERGAMMAGLOBULINEMIA—

(a) *Diffuse 'broad band' type*—Chronic infection, cirrhosis of liver, collagen vascular disease, ulcerative colitis, regional enteritis, Hashimoto's thyroiditis.

(b) *Narrow 'M band' type*—Multiple myeloma. Waldenstrom's macroglobulinemia, 'benign' especially in old age Leukemia, Hodgkin's disease, carcinoma.

HYPOGAMMAGLOBULINEMIA—

(a) *Primary*—Physiological in infancy, idiopathic acquired, congenital sex-linked, alymphocytic, primary lymphopenic, associated with thymoma.

(b) *Secondary*—(i) Protein deficiency—Malnutrition, malabsorption, nephrotic syndrome, protein-losing enteropathy, exfoliative dermatitis. (ii) Defective synthesis—Multiple myeloma, lymphoreticular disease, irradiation, cytotoxic drugs.

FIBRINOGEN—0 2-0.4 g./100 ml. (5 9-11.7 $\mu$ mol/1).

*Elevated*—Glomerulonephritis, nephrosis (occasionally), and infectious diseases

*Decreased*—Accidents of pregnancy (placental ablation, amniotic fluid embolism, violent labour), acute and chronic hepatic insufficiency, congenital fibrinogenopenia, and occasionally with prostatic carcinoma.

**C-reactive protein**—(CRP)—Normal 0-20 g/ml. It is an acute phase protein in acute rheumatic fever (unaffected by cardiac failure or anemia) and most connective tissue diseases but in SLE there is a slight rise in CRP with disease activity. CRP levels rise normally with infection in SLE patients and this is useful in distinguishing disease activity from infection

**Plasma viscosity:** Normal 1 50-1.72 centipoises

ENZYMES:

**Alkaline phosphatase**—Normal 5-13 KA or 2-5 Bodansky units per 100 ml.

*Increased*—(i) Osteoblastic bone disease, e g. osteitis fibrosa cystica, Paget's disease, osteogenesis imperfecta, severe osteomalacia, osteogenic sarcoma, metastatic carcinoma of bones. (ii) Hepatic duct or cholangiolar obstruction due to stone, stricture or neoplasm Hepatic disease resulting from drugs such as chlorpromazine, methyltestosterone. (iii) Myeloid leukemia. (iv) Hyperparathyroidism. (v) Hyperpituitarism. (vi) Physio-

*E.C.G.*—RA hypertrophy but no RVH.
*X-ray*—Enlarged RA, lung fields usually clear.

**Treatment:** Replacement of the valve.

## PULMONARY REGURGITATION

**Causes:**

1. *Congenital*—With Tetralogy of Fallot, Marfan's syndrome, Eisenmenger's syndrome, isolated, with PDA, idiopathic dilatation of pulmonary artery.
2. *Acquired*—With idiopathic pulmonary hypertension, MS, SBE, rheumatic fever, syphilis, carcinoid syndrome, aneurysm of pulmonary artery, pulmonary hypertension.

**Signs:** Early diastolic murmur similar in quality to that of AR, conducted down the left sternal border. Associated signs of pulmonary hypertension.

*E.C.G.*—Right ventricular hypertrophy.
*X-ray*—Enlargement of pulmonary artery.

## 6. SUBACUTE INFECTIVE ENDOCARDITIS

**Etiology:**

1. CARDIAC LESION—(a) *Acquired*—Rheumatic heart disease in majority with mild MR or AR, rarely syphilitic AR or calcific AS. (b) *Congenital*—PDA, PS, VSD, bicuspid aortic valve, coarctation of aorta, aneurysm of sinus of Valsalva. (c) *Normal heart*—Massive infection of right side of heart in drug addicts who inject themselves IV under unsterile conditions may produce tricuspid incompetence. (d) *Prosthetic valve*—after cardiac surgery.

2. FACTORS DETERMINING SITE OF INFECTION—The common factor is a high velocity jet of blood which damages the endocardium. Infection is more likely to occur when there are large pressure differences between chambers. Hence the *lesions immune* are—ASD of secundum type, large VSD, severe MS and atrial fibrillation, and cyanotic congenital heart disease. The left side of the heart is much more commonly involved because of higher oxygen saturation promoting growth of aerobic bacteria, and the higher pressure causing more intimal damage.

3. CAUSATIVE ORGANISM—(i) *Bacterial*—Common—Streptococcus viridans, staphylococcus and enterococcus (S. faecalis). Uncommon—pneumo- gono- or meningo-coccus, B. proteus, B. pyocyaneous, H. influenza and Brucella abortus (ii) *Non-bacterial*—(a) *Ricketssial*—Coxiella burnetti. (b) *Fungal*—Candida, monilia, aspergillus, histoplasma and torulosis (c) Chlamydia type B agent of psitaccosis.

4. *Thymus*—Enlargement, tumor.
5. *Oesophagus*—Achalasia, corkscrew oesophagus, enterogenous cyst.
6. *Cysts*—Dermoid, cystic hygroma, teratoma, bronchogenic cyst, pleuro-pericardial cyst.
7. *Herniae*—Hiatus, diaphragmatic, herniation of lung.
8. *Neurogenic*—Tumors and cysts, meningocele.
9. *Miscellaneous*—Mediastinal abscess, cardiac aneurysm or tumor, lipoma, mesothelioma.

**Unilateral hilar enlargement:**

1. Bronchogenic carcinoma.
2. Metastaic adenopathy.
3. Lymphatic leukemia.
4. Tuberculosis.
5. Fungus disease.
6. Sarcoidosis
7. Lymphnode hyperplasia.
8. Pulmonary artery lesions —PS, idiopathic dilatation.
9. Mediastinal masses.

**Bilateral hilar enlargement:**

1. Tuberculosis.
2. Sarcoidosis.
3. Fungus infection.
4. Lymphoma
5. Metastatic malignancy, recurrent embolism.
6. Leukemia.
7. Erythema nodosum.
8. Pneumoconiosis.
9. Vascular lesions—acute massive pulmonary embolism

**Diffuse alveolar opacification or consolidation:**

1. Pulmonary oedema.
2. Uremic pneumonitis
3. Intra-alveolar hemorrhage.
4. Pneumonia.
5. Infectious granulomas.
6. Sarcoidosis
7. Shock lung.
8. Fat embolism.
9. Alveolar proteinosis.
10. Alveolar cell carcinoma.
11. Desquamative interstitial pneumonitis.

**Complete opacification of one hemithorax:**

1. Massive pleural effusion.
2. Massive pneumonic consolidation.
3. Atelactasis.
4. Thoracic trauma
5. Diaphragmatic hernia.
6. Pleural mesothelioma.
7. Pulmonary agenesis.
8. Unilateral pulmonary oedema.
9. Mediastinal tumor.
10. Destroyed lung (chronic inflammation and fibrosis).

II. **Cardiac signs:**

(i) *Murmur*—(a) *Organic heart murmur*—due to valvular defect or congenital cardiovascular lesion. (b) *Alteration of intensity of murmur* is good evidence of infection. (c) *Development of new murmurs*—due to perforation of ventricular septum, rupture of sinus of Valsalva, acute MR or acute AR (d) *Absence of murmur*—if endocarditis involving mural thrombus complicating healed myocardial infarction or early acute endocarditis involving previously normal valve. (ii) *Cardiac decompensation*—may occur due to toxic myocarditis. Rarely pericarditis, or coronary occlusion. In case of acute valvular incompetence, pulmonary oedema will occur with little cardiac enlargement and is associated with a sharp fall in cardiac output.

III **Signs of embolism:**

(1) *Osler's nodes*—Tender peasized nodules on pads of fingers and toes. Often pale in the centre. May occur in crops. Fade after few days usually without breaking down or leaving any residua. Either due to minute emboli in superficial terminal vessels or due to vasculitis.

(2) *Petechiae*—Petechial haemorrhages in palpebral conjunctivae, buccal and pharyngeal mucous membrane and as splinter haemorrhages (splinter fingers) beneath nail beds. (Petechiae are due to breaks in the endothelium of small vessels that are the site of attachment of antigen-antibody complexes) White-centre haemorrhages may be seen in ocular fundi (Roth's spots).

(3) *Janeway lesions*—Large non-tender macules on palms and soles.

(4) *Embolism*—(i) Cerebral embolism producing hemiplegia or mycotic aneurysms which may subsequently rupture. (ii) Renal embolism causing colic and hematuria (iii) Retinal with disturbing vision. (iv) Of mesenteric arteries causing acute abdominal pain; splenic infarction with sudden local pain and perhaps friction. (v) Peripheral vessel embolism resulting in gangrene of an extremity. (vi) Pulmonary embolism with left-to-right shunts or involvement of pulmonary valve. (vii) Cardiac infarction.

**Complications** (Causes of death)—

1. Acute valve perforation.
2. Embolism and rupture of mycotic aneurysm.

*Bilateral*—Infants, sthenic build, obesity, pregnancy, ascites, large abdominal mass, intestinal distension, large liver, bilateral intrathoracic infection.

## Abdominal X-rays

**Calcification (radio-opacities) on an abdominal x-day:**

1. Faecoliths.
2. Phleboliths.
3. Calcified lymphnodes.
4. Calculi—Renal, biliary, prostatic.
5. Liver—Calcified hydatid, tuberculous, amoebic abscess, gumma, histoplasmosis, hemangioma, hepatoma, brucellosis.
6. Renal (urogenital)—Radio-opaque stones, renal tubular acidosis, secondary to hypercalcemia, cortical necrosis, sponge kidney, tuberculosis, calcification in hypernephroma and polycystic kidneys. Prostatic calculi. Calcification of bladder tumors. Bilharziasis.
7. Spleen—Splenic stones, calcified cyst of spleen.
8. Pancreas—Chronic pancreatitis.
9. Suprarenal—Addison's disease, neuroblastoma or carcinoma.
10. Calcified aorta.
11. Calcified tumor—Dermoid, fibroid.
12. Foetus.
13. Calcification in abdominal wall—e.g. cysticerci.
14. Calcified tablets

**Hepatic calcification:**

1. Amoebic abscess.
2. Tuberculosis.
3. Hepatoma.
4. Hydatid cysts.
5. Brucellosis
6. Gumma
7. Hemangioma.
8. Histoplasmosis.
9. Intrahepatic biliary calculi.

**Small kidney(s):**

*Unilateral*—

Pyelonephritis (reflux).
Renal artery stenosis.
Post-obstructive or post-inflammatory atrophy.
Renal vein thrombosis (late stage).

rin should be added to each litre. Streptomycin 1 g. or Gentamicin 80 mg. 8-hourly IM daily is added. If still no response substitute other antibiotic as shown by blood culture sensitivity.

*St. faecalis*—Penicillin IV 20 mega units/day (or Ampicillin 4 g daily) with Streptomycin 0.5 g or Gentamicin 80 mg t.d s.

*Staphylococcus*—Cloxacillin or Cephaloridine 1 gm. IM 6-hourly, or Fucidin 500 mg. t.d.s. with gentamicin.

*H. influenzae*—Ampicillin or Amoxycillin 500 mg. 6-hourly.

*Ps. pyocyaneus*—Colistin 1.5 mega units IM 8 hourly for at least 2 weeks.

*B. proteus*—Cephaloridine 500 mg. 8-12 hourly.

*Rickettsia*—Tetracycline 1 g with lincomycin 2 g daily by mouth.

*Fungus infections*—Amphotericin B 50-100 mg. per day by slow IV drip in dextrose, with 5-fluocytosine 8 g daily.

EFFECTIVENESS OF THERAPY

*Bactericidal blood levels*—A major advantage of positive blood culture before treatment is that effectiveness of treatment can be checked by measuring the dilution at which the serum of the patient is bactericidal to the infecting organism. A bactericidal effect at a dilution of 1:8 immediately before a dose is generally satisfactory.

*Persistence of fever*—If fever remains uncontrolled with presumably adequate treatment, possibilities are—(1) Drug hypersensitivity (rash and other manifestations). (2) Local reaction at injection site. (3) Persistence of focus of infection e g. splenic or other abscess, dental apical granuloma (4) Bacterial L-forms resistant to usual antibiotics may have developed. (5) Increased bacterial resistance can be acquired during treatment due to inadequate initial treatment (6) Unsuspected multiple infections. (7) Another organism may have been acquired during therapy especially if indwelling IV lines are used.

2. GENERAL MEASURES—(a) Complete rest in bed. (b) High protein diet with added vitamins and iron. (c) Small repeated blood transfusions if severe anaemia.

3. SURGICAL TREATMENT—*Indications*—(1) Infection cannot be controlled medically. (2) Acute or chronic heart failure as a result of valve destruction especially aortic valve, septal defects, aneurysms and major emboli. (3) When infection of prostheses persists and there is disruption inspite of medical treatment. (4) In candida and rickettsial infections removal of valve in addition to chemotherapy may help. (5) Infected tricuspid value (common in drug addicts) may be removed without replacement.

FOLLOW-UP-CARE—1. Record of daily temperature twice for 3 months after cessation of therapy. 2. After treatment is com-

*Pathological*—

1. Myelomatosis.
2. Hyperparathyroidism.
3. Metastatic deposits from thyroid, bronchus, breast or kidney.
4. Leukemias.
5. Sickle-cell anemia.
6. Cushing's.
7. Histiocytosis.

**Intracranial calcification:**

*Physiological*—Calcification of pineal gland, choroid plexus or falx cerebri, hypophysis (after age of 60).

*Pathological*—

(a) Infections and infestations—Calcification in tuberculoma, cysticercosis or hydatid cyst.
(b) Vascular lesions—Calcification of carotid siphon in arteriosclerosis or in arteriovenous malformation.
(c) Tumors and cysts—Calcification in meningioma and in craniopharyngioma, calcified dermoid.
(d) Miscellaneous—Tuberose sclerosis, Sturge-Weber syndrome or hypoparathyroidism.

**Punched-out erosions in extremity bones:**

1. Gout.
2. Rheumatoid arthritis.
3. Osteoarthritis.
4. Sarcoid.
5. Multiple myeloma.
6. Hand-Schuller-Christian disease.
7. Hyperparathyroidism.
8. Leprosy.

**Periosteal calcification:**

1. Subperiosteal hemorrhage
2. Following a fracture.
3. Bone infection—Tuberculous, pyogenic or syphilitic.
4. Pulmonary osteoarthropathy.
5. Bone neoplasms and secondary deposits.

**Increased bone density:**

1. Developmental osteopetrosis (marble bone disease).
2. Developmental osteopoikilosis.
3. Secondary deposits.
4. Myelosclerosis.

*Signs—Inspection*—Face and neck of high colour. Swelling of one or both arms and engorged veins on front of chest Unilateral finger clubbing may be seen usually right sided. Visible pulsating mass may be seen in 2nd or 3rd right interspace, and there may be exaggerated pulsations in the right sterno-clavicular joint or in the episternal notch.

*Palpation*—Diastolic shock in aortic area. *Auscultation*—Ringing 2nd aortic sound. Systolic and diastolic murmur may be heard. Pulse—Volume reduced. B.P. lower on right side.

*Signs of compression*—Pressure on right eparterial bronchus may cause diminished air entry at right apex. Involvement of right recurrent laryngeal nerve produces at first abductor paralysis followed by complete paralysis.

(B) ANEURYSM OF ARCH—(Aneurysm of symptoms).

*Symptoms and signs* are due to compression of surrounding structures:

1. *Due to compression*—
   - (i) *Compression of trachea or bronchus*—Cough, dyspnoea, hemoptysis, tracheal tug, diminished air entry in either lobe of lung and rarely bronchiectasis
   - (ii) *Compression of oesophagus*—Dysphagia.
   - (iii) *Compression of vessels*—(a) Veins—Oedema of face and neck, distended neck veins, prominent veins on upper chest. (b) Arteries—Radial pulse weaker and B P. lower in left arm.
   - (iv) *Compression of nerves*—(a) Left recurrent laryngeal—hoarseness of voice. (b) Cervical sympathetic—Horner's syndrome. (c) Vagus—tachycardia. (d) Phrenic—Hiccough and paralysis of left dome of diaphragm. (e) Intercostal nerves and brachial plexus—Chest pain and pain in left arm
   - (v) *Bones*—Deep seated continuous bone pain due to erosion of bones.
2 *Systolic pulsation*—may be detected over manubrium or left interscapular region and thrill may be palpable

V. **Myocarditis**—(i) *Diffuse granulomatous myocarditis*—Arrhythmias or congestive cardiac failure. (ii) *Localised gumma*—AV block or valvular pseudostenosis if gumma impinges on ventricular outflow tract

**Management of cardio-vascular syphilis:**

1. *Active treatment*—to arrest the syphilitic process and prevent further progress of the lesions. Penicillin is drug of choice. In case of high ESR initial course of pot iodide 0 6 gm 6-hourly for 2 weeks or prednisolone 20 mg. daily for 2 days

11. Pheochromocytoma
12. Fallot's tetralogy.
13. Glaucoma.
14. Schizophrenia

**Chloroquine :**

1. Malaria.
2. Hepatic amoebiasis.
3. Rheumatoid arthritis.
4. Lupus erythematosus, discoid and systemic.
5. Clonorchiasis.

**Metranidazole :**

1. Amoebiasis.
2. Giardiasis.
3. Ulcerative gingivitis.
4. Trichomonas vaginalis. (both sexes)

**Diethylcarbamazine :**

1. Tropical eosinophilia.
2. Filariasis.
3. Toxocariasis.

**Bromocriptine :**

1. Parkinson's disease
2. Acromegaly.
3. Hyperprolactinemia—Prolactin secreting pituitary adenoma. Suppression of lactation.
4. Cyclic benign breast disease.
5. Premenstrual syndrome.

**Sodium chromoglycate :**

1. Prevention of bronchial asthma.
2. Allergic rhinitis.
3. Ulcerative colitis.

**Corticosteroids :**

A. THERAPEUTIC—

1. Replacement therapy—Addison's disease, hypopituitarism.
2. Immunosuppression—Rheumatic fever, rheumatoid arthritis, ankylosing spondylitis, collagen disease, chronic active hepatitis Acquired hemolytic anemia, thrombocytopenia.
3. Suppression of inflammatory oedema—Bell's palsy, acute infective polyneuritis, cholestatic jaundice, complete heart block.

9. *Cigarette smoking*—There is a continuous increase in risk of IHD with increased intensity of cigarette smoking, particularly in younger age groups. The prevalence of IHD does not seem to be appreciably increased in pipe or cigar smokers or those who chew tobacco.
10. *Obesity*—predisposes. The relationship between overweight per se and IHD is complex and may be due, at least in part, to relationship of obesity to serum lipid levels.
11. *Emotional factors*—IHD is more likely to develop in a person with aggressiveness, competitiveness and a sense of time urgency.
12. *Diabetes mellitus*—predisposes to IHD.
13. *Other factors*—(i) Physical inactivity. (ii) Hyperuricemia, (iii) Early menopause in women. (iv) Polycythemia.

**Clinical manifestations:**

1. Angina pectoris.
2. Acute coronary insufficiency.
3 Cardiac infarction.

## Angina Pectoris

**Causes:**

1. *Decreased coronary blood flow*—
   (a) Gradual narrowing or occlusion of one or more of the major coronary arteries.
   (b) Spasm of a coronary vessel, especially arteriosclerotic.
   (c) Affection of mouths of coronary arteries as in syphilitic aortic insufficiency or calcific aortic stenosis.
   (d) Low diastolic pressure causing low coronary blood flow, e.g., acute haemorrhage or shock.
2. *Increased oxygen consumption*—e.g., hyperthyroidism and severe anaemia.
3. *Combination of decreased coronary blood flow and increased oxygen requirement*—Paroxysmal tachycardia.
4. *Coronary arterial spasm*—Important mechanism in some patients, particularly those with pain occurring mostly at rest.

PRECIPITATING CAUSES—(1) Physical exertion. (2) Heavy meal. (3) Exposure to cold. (4) Emotion and excitement particularly anxiety and anger. (5) Hyperinsulinism in diabetic patients. (6) Other causes—Straining at stool, bathing, sexual intercourse, micturition.

# NOTES

emotional upset or other common triggering factors. Coronary arterial spasm has been shown to play a part in some episodes.

3. *Dyspnoea rather than pain.*
4. *Second wind angina*—Pain occurs at beginning of exertion, subsequently the patient is able to 'walk off' the pain.
5. *Nocturnal angina*—may develop after a period of angina of effort, or may represent the initial pattern of angina. It may be related to dreams, or latent LV failure.
6. *Angina with syncope*—may be caused by cardiac arrhythmia.
7. *Sweating and nausea* (or vomiting) because of severe pain.
8. *Prinzmetal's angina* (Angina inversa)—Attacks may occur without effort same time each day. Pain of longer duration and severe. E.C.G. shows elevation of ST segments (instead of usual depression) during the pain.
9. *Bradycardia angina*—Angina results from inability of heart to accelerate adequately in response to exercise or emotion.
10. *Paroxysmal atrial fibrillation*—may be the first evidence of ischaemic heart disease particularly in middle-aged patients.

**Diagnostic tests:**

1. STRESS (EXERCISE) TEST—(a) *Master's test*—Patient goes over two 9 inch steps for 1.5 minutes (single test) or 3 minutes (double test). (b) *Treadmill stress exercise*—Graded exercise tolerance test more sensitive than Master's test (c) *Electrocardiorecorder*—for continuous recording of E C.G. on magnetic tape for up to 10 hours. Can be used while patient carries on his normal daily activities or for studying attacks of chest pain which occur during rest or sleep. Positive test consists of—(a) *ECG changes*—(i) ST segment depression with flattening or inversion of T waves. (ii) Ectopic beats may occur. (iii) Disturbance of conduction such as prolonged PR interval or bundle branch block. (b) *Changes in B P.*—Blood pressure should rise during exercise, if it fails to change or falls, the patient is likely to have severe coronary disease. (c) *Coronary index*—There is a good correlation between maximal work load and severity of coronary disease. The latter has been judged by an index of severity (coronary index) from coronary angiograms, taking into consideration all the lesions in the coronary circulation.

contraction of left ventricle occurring at rest or induced by exercise.

4. PACING—Stress by cardiac pacing may cause elevation of LV end-diastolic pressure accompanying anginal pain. Diagnostic value of this test is limited because pacing can be expected to induce pain in only about 50% of patients with mild to moderate effort angina.

5. TRINITRIN TEST—Sublingual nitroglycerin will relieve pain of angina within one or two minutes provided myocardial infarction has not recently occurred

**Differential Diagnosis:**

1. *Cardio-vascular conditions*—See D.D. of infarction.
2. *Non-cardiac conditions*—

(a) *Anxiety states*—

| *Angina pectoris* | *Anxiety states* |
|---|---|
| Usually in men over 50. | Common in women and young men. |
| Pain sternal or across chest. | Pain mammary, above or below left breast. |
| Radiation to one or both arms, neck and jaw. | Radiation to left scapula, left arm and left side of neck. |
| Sensation of constriction, tightness, or pressure | Dull ache or soreness with stabbing or shooting pain. |
| Provoked by effort. | Provoked by worry and fatigue. |
| Pain during effort. | Pain may occur after effort. |
| Relieved at once by halting | May persist for hours or days, little and slow relief by rest. |
| Usually well apart from pain | Symptoms of general and neurotic ill health common. Sighing respirations. |

(b) *Local diseases of chest wall*—Neuralgia, herpes zoster of intercostal nerves, local pain and swelling of costochondral or chondrosternal joints (Tietze's syndrome), or of xipho-sternal joint, fibrosis or myalgia of chest wall or injury to pectoralis muscle.

(c) *Gastro-intestinal and biliary disease*—Gaseous distension, peptic ulcer, cholecystitis, oesophageal spasm, achalasia cardia, hiatus hernia, distension of splenic flexure.

Verapamil (Isoptin) 40 mg. t.d s. Nifedipine (Adalat) 10 mg. t.d.s.

(c) *Beta-adrenergic blocking agents*—lower myocardial $O_2$ requirement by reducing heart rate, blood pressure and cardiac contractility. Contraindicated in presence of bronchial spasm, cardiac failure, diabetes mellitus requiring insulin therapy, bradycardia or A-V block. Drugs—(a) *Propranolol*—10-60 mg. q.d.s. (b) *Oxprenolol (Trasicor)*—40 mg. t.d.s. (c) *Timolol maleate (Blocarden)*—10 mg. t.d.s.

(d) *Anticoagulant therapy*—Indications—(i) Intractable or crescendo angina. (ii) Previous history of myocardial infarct. (iii) Young patient with family history of ischaemic heart disease and high serum cholesterol. (iv) Diabetes. (v) Acute coronary insufficiency. (For dosage see treatment of myocardial infarction).

(e) *Digitalis and diuretics*—when patient has cardiac failure with enlarged heart and pulmonary venous congestion.

B **Surgical treatment:**

1. *Coronary bypass surgery* with homologous saphenous vein grafts to bypass the obstruction. Indications—(i) Patients who fail to respond to medical therapy or are incapacitated by pain. (ii) Those in whom anginal attacks are accompanied by major complications e.g. ventricular tachycardia. (iii) Patients with blockage of one large coronary arterial branch, because of danger of sudden death or massive infarction. Operative mortality low and results good
2. *Percutaneous transluminal coronary angioplasty*—A double-lumen balloon is introduced by the use of a guiding catheter positioned in the coronary artery. The balloon is inflated across the coronary stenosis, thereby enlarging the lumen. The catheter is withdrawn after balloon deflation. Indications—(a) Angina refractory to medical treatment. (b) Single vessel disease with proximal noncalcified stenosis and good LV function. (c) Unstable angina. (d) Elderly patient. (e) Those who had preliminary bypass surgery.

## Acute coronary insufficiency (Unstable angina)

A condition half-way or intermediate between angina pectoris and cardiac infarction. Sudden appearance or aggravation of anginal pain without any precipitating factor, and occurring more frequently, more prolonged and may last for an hour or so. (Also see differential diagnosis of cardiac infarction).

E. TUBERCULOSIS OF UTERINE ADNEXA—Tuberculous salpingo-oophoritis.

## INTESTINAL TUBERCULOSIS

**Etiology :**

1. *Age*—usually 20-40. (2) *Sex*—more in females. (3) *Types* —(a) Secondary tuberculous enteritis—commonest complication of pulmonary tuberculosis and hence due to human strain of bacillus. The locus of infection is most likely to occur in areas of increased physiologic stasis, regions of most abundant lymphoid tissue, areas of increased rate of absorption and areas where small bowel contents are more completely digested permitting closer contact of the acid fast bacillus with mucosal surface. (b) Primary tuberculous enteritis—due to infection with bovine strain of tubercle bacillus usually.

**Secondary tuberculous enteritis (Ulcerative type) :**

SYMPTOMS :

*Abdominal pain*—Chief complaint. Most often in lower right quadrant, but may be felt in periumbilical region or hypogastrium. Pain most often after eating. Vomiting and/or defecation often relieve distress. Pain cramping or colicky or dull and diffuse. With partial obstruction, severe cramps with borborygmi.

*Diarrhoea*—Daily 3-6 semisolid to liquid stools. Mucus not uncommon but blood and pus rare. Steatorrhoea may develop depending upon extent and location of inflammation.

*Weight loss*—due to anorexia and fear of eating (sitophobia) because of pain. Fever. Haemorrhage rare because of associated obliterative endarteritis.

SIGNS: Vigorous persistaltic activity, or distended bowel may be noted. Tenderness usually in lower right lower quadrant. Muscle guarding if peritoneum is involved. In presence of ileocecal tuberculosis a tender fixed mass may be palpated in half the cases.

COMPLICATIONS—Obstruction, perforation with abscess and/or fistula formation, or free peritonitis, localised peritonitis, adhesions, intusussception and traction diverticula.

DIAGNOSIS :

1. *Clinical*—Possibility of intestinal tuberculosis should be considered if—(i) Lung cavity with positive sputum. (ii) Abdominal symptoms appear in association with change of

7. Silent myocardial infarction—little or no chest pain
8. Arterial embolism, e.g. hemiplegia or embolism of limb artery.
9. Syncope—due to hypotension, transient cardiac arrest, ventricular fibrillation or onset of complete heart block.
10. Acute confusional state—especially in aged.
11. Pulmonary embolism.
12 Profuse sweating.
13. Progressive renal failure with azotemia in elderly.

**Signs :**

1. *Heart*—(a) *Palpation*—With extensive anterior infarction paradoxical pulsation may be felt during systole in area internal to and above the apex beat. This is caused by systolic forward bulging of the infarcted anterior wall of the heart during ventricular contraction. (b) *Auscultation* —(i) Heart sounds—muffled and distant. Tachycardia with tic-tac or gallop rhythm which suggests severe LV failure, or shock. A fourth sound can be heard frequently and in absence of hypertension is almost diagnostic Reversed splitting of 2nd sound due to LV dysfunction or LBBB. (ii) Systolic murmur—Soft apical pansystolic murmur is common and is due to functional MR from cardiac enlargement, or malfunction of papillary muscles. It usually disappears within a few days. Rarely a loud systolic murmur caused by rupture of papillary muscle, or of the ventricular septum (iii) Pericardial rub—may appear transiently usually on second or third day.
2. *B.P.*—May show transient rise during the attack, but is often quickly reversed A slow progressive fall of blood pressure occurs over a period of days. If patient develops cardiogenic shock there is severe fall of pressure.
3. *Pulse*—Usually rapid unless A-V block. Poor volume. Irregularity may be due to cardiac arrhythmia.
4. *Lungs*—May be clear, or show few basal rales.
5. *Fever*—On second or third day 38-39°C. Lasts 4 to 7 days. Increase or reappearance of fever may be due to cardiac failure, pulmonary infarction or oedema, extension thrombosis or late pericarditis.

**Investigations :**

1. *Serum enzymes*—(a) *Creatine kinase* (CK)—CK-MB activity usually rises 4-6 hours after onset, and reaches maximum in 16-24 hours, and then declines rapidly. It is the most

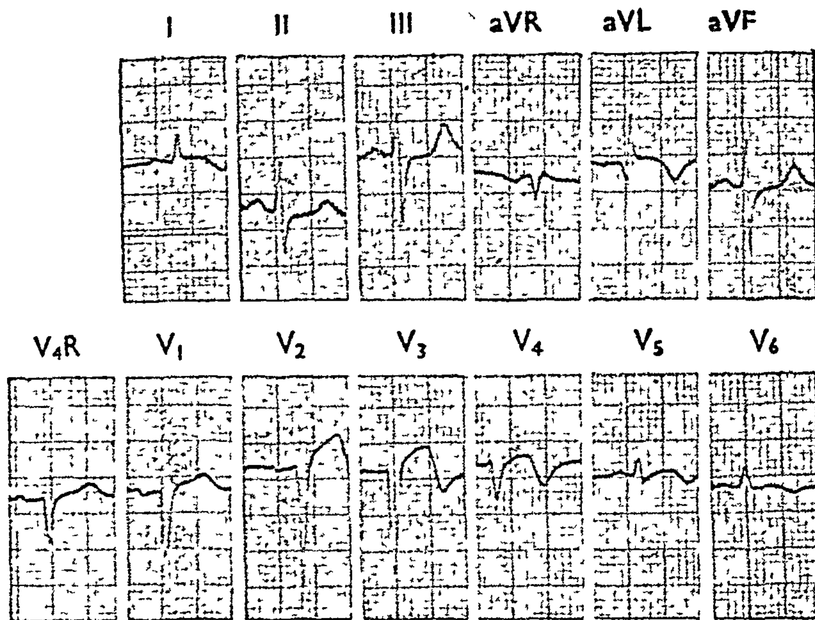



Fig 2 28 Extensive anterior infarction

3. *Other non-specific investigations*—(a) ESR—30-80 mm. in one hour in first week (b) White cell count—increased. (c) Blood glucose—raised during first few days.

**Differential Diagnosis** (Of precordial pain) :

I **Coronary artery and myocardial diseases**—

1. *Angina pectoris*—

| | *Angina pectoris* | *Myocardial infarction* |
|---|---|---|
| 1. Exciting factor .. | After exertion, cold or heavy meals | Without visible cause, usually during rest at night |
| 2. Attitude ... | Immobile | Restless |
| 3 Pain — Site . | Retrosternal | Usually retrosternal but may be precordial |
| Duration . | Never more than 5 minutes | About ½ an hour or more |
| Radiation . , | To both arms, neck or jaw | Not so diffuse |
| Relief | Nitrites | Nitrites have no effect |
| 4 Vomiting . | Absent | Common |
| 5. Dyspnoea | None Only breath held | Common |
| 6. Shock ... | Absent | Marked |

2. *Dissecting aneurysm*—

| | *Dissecting aneurysm* | *Myocardial infarction* |
|---|---|---|
| Fainting . | Common | Uncommon |
| Pain ... | Chest or back, transmitted to both arms or legs or back Peak intensity at onset | Precordial or epigastric, transmitted to left arm Increases in intensity after it commences |
| Nervous symptoms | Possible paralysis | Nil |
| Murmur | Aortic diastolic murmur may appear | Apical systolic murmur may be heard |
| B P | Remains high | Falls |
| Other arteries | May show signs of involvement | Not affected |
| E C G. . | Normal or changes consistent with pericarditis | Typical pathognomonic changes |
| Chest x-ray . | Widening of supracardiac shadow. Double aortic knob may be seen | No specific abnormality |
| Serum enzymes . | No change | Elevated |

III. **Pericarditis**—

| | *Acute idiopathic pericarditis* | *Myocardial infarction* |
|---|---|---|
| Pain ... | Increased by deep breathing or lying down or coughing | Not affected by postural change or cough |
| Friction rub | Within first few hours | 24-48 hours after onset of pain |
| Serum enzymes . | Usually no change | Elevated |
| E C G. . | Elevation of RS-T segment in all three limb leads No abnormal Q waves | Reciprocal elevation & depression of RS-T in I & III prominent $Q_1$ or $Q_3$ |

IV. **Pulmonary affections**—

1. *Massive pulmonary embolism*—

| | *Pulmonary embolism* | *Myocardial infarction* |
|---|---|---|
| History | Convalescent | Of angina of effort |
| Pain ... | Severe, no typical localization | Pressing or crushing substernal, radiating to shoulder or arm |

sternum. Fine crepitations over sternum on deep breathing or synchronously with heart beats

VI. **Gastro-intestinal affections**—

1. *Acute indigestion*—Pain not typically retrosternal and no radiation. Shock absent. Marked dyspeptic symptoms. E.C.G.—Normal.

2. *Acute cholecystitis and cholelithiasis*—Pain colicky in nature. Usually in epigastrium at onset. Radiation to back beneath right scapula or shoulder. An early sign may be a palpable distended gall bladder (Cope's sign). The G.B. may then expel its contents and both pain and swelling may disappear for few hours followed by localisation of pain in right hypochondrium. No dyspnoea. Jaundice may be present. History of previous attacks.

3. *Acute abdomen*—e.g. perforated ulcer.

| *Acute abdomen* | *Myocardial infarction* |
|---|---|
| History of abdominal symptoms. | History of angina. |
| Radiation of pain over abdomen. | Radiation of pain to arms. |
| Pulse may be slow at onset. | Pulse rapid. |
| Respiration shallow and thoracic. | Respiration abdominal. |
| Rigidity extreme and persists. | Rigidity not so board like and varies with respiration. |
| Heart sounds normal. | Diastolic gallop. |

4. *Diffuse spasm of oesophagus*—Severe anterior chest pain, may be precipitated by emotional upsets or may wake patient from sleep Dysphagia may occur but no circulatory changes. Barium studies (acidified barium may be needed to provoke spasm) reveal nonpropulsive or tertiary contractions (corkscrew or beaded oesophagus).

5. *Hiatus hernia*—Pain usually simulates angina but if persisting over an hour resembles coronary occlusion. Both sexes equally affected. Fullness during or shortly after meals, regurgitation, belching, nausea and vomiting common. Pain at night can be prevented by sleeping propped up on pillows, aggravated by stooping or bending forward. Pain commonly burning and relieved by antacids.

**Complications:**

A **Early complications:**

1. *Arrhythmias and defects of conduction*—The type and frequency of arrhythmia is related to the size and site of infarction. However within the first few hours any type of abnormal rhythm may occur.

2. *Cardiogenic shock*—Clinical criteria—(a) Systolic B.P. below 90 mm. Hg. (b) Metabolic acidosis. (c) Cold and clammy skin. (d) Oliguria or anuria. (e) Cerebral symptoms such as anxiety, confusion, apathy, somnolence and fatigue. Fatal in majority.

3. *Cardiac failure*—Left ventricular or congestive cardiac failure.

4. *Papillary muscle dysfunction and rupture*—Apical systolic murmur occurs with papillary muscle malfunction, it usually disappears as the infarct heals. Rupture is suggested by sudden onset of breathlessness and other features of cardiac failure. A very loud systolic murmur develops at apex. Death results in most cases.

5 *Embolism*—(i) *Pulmonary*. (ii) *Systemic arterial*—particularly in patient with atrial fibrillation. Cerebral embolism is most frequent and most serious. The thrombus usually arises in LV in relation to the endocardial area affected by infarction, but may arise in left atrium.

6. *Cardiac rupture*—(i) *Through the free ventricular wall*—more likely in elderly. Patient dies suddenly. (ii) *Through the septum*—Sudden development or deterioration of cardiac failure, with occurrence of very loud pansystolic murmur at left sternal edge, often accompanied by a thrill E.C.G. shows evidence of septal involvement.

B. **Late complications:**

1. *Ventricular aneurysm*—Suggested by palpable and visible paradoxical systolic pulsation in anterior chest wall. E C.G. shows Q waves with persistently elevated ST segments in leads $V_1$ to $V_4$. X-ray chest may show abnormal rounded bulge Cine-ventriculography will show paradoxical movement of the affected area.

2. *Post-myocardial infarction syndrome* (PMI, Dressler's syndrome)—Pleural and pericardial pain and fever. Most common from 1-6 weeks after onset. The syndrome often subsides within a few days. Responds to steroids. Probably an immune reaction to cardiac muscle damage.

through the bowel wall, which occurs at a potentially weak spot where the bowel is pierced by blood vessels near the tenia coli. Most often there are many diverticula (diverticulosis) situated mostly in sigmoid and descending colon. Abnormal muscle contraction of the colon may lead to development of pulsion diverticula. Inflammation of a diverticulum (diverticulitis) occurs when faecal material becomes inspissated and retained in the sac. A low residue diet may play a role.

**Clinical Features:**

I. **Localised diverticular disease (of sigmoid colon)—**

(a) Simple diverticular disease—Vague dyspepsia, nausea, flatulence and distension with small, frequent stools, the passage of flatus often removing the lower abdominal discomfort. On palpation there may be slight discomfort over sigmoid colon. Cramps and colic suggest onset of obstruction.

*Management*—(i) High fibre diet including unrefined foods such as wholemeal bread, bran, rough porridge, muesli, and cereals containing bran. Bran can be taken either loose or in form of tablets to be chewed and washed down with water. (ii) Use of bulk agents like methylcellulose or isabgul which enables a formed stool to be passed daily. (iii) Antispasmodics may be used for pain. (iv) Tranquillisers for tense patients. Strong purges and enemas should be avoided.

(b) Acute diverticulitis—Inflammation of one or more diverticula produces features of 'left-sided appendicitis' with fever, nausea, and vomiting and with localised pain, tenderness and guarding. This condition may resolve on conservative treatment or may progress to abscess formation with a localized tender mass and raised leucocyte count. On rectal examination a tender extrarectal mass is often felt.

*Complications*—(a) Perforation with either a local paracolic abscess or free perforation with general peritonitis. (b) Fistula formation—into adjacent viscus particularly the bladder. Also small bowel, uterus, uterine adnexae or vagina. (c) Haemorrhage —from erosion of a blood vessel at the neck of the diverticulum.

**Treatment:**

1. *General*—(a) Rest in bed. (b) Heat to affected part of abdomen. (c) Ample fluids. (d) Analgesics.

—(i) Gastro-intestinal—Peptic ulcer, hiatus hernia, hepatic disease, steatorrhoea. (ii) Cardiovascular—Malignant hypertension, retinopathy, subacute bacterial endocarditis. (iii) Known surgical disorder of kidneys or blood urea constantly over 70 mg. per 100 ml. (iv) Neurological—Previous cerebrovascular accident (unless embolic), recent surgery or trauma to the central nervous system (v) Hematological—Any patient known to have preexisting hemostatic defect. (vi) General—Pregnancy.

*Drugs*—(a) *Heparin*—which is rapidly acting is given in doses of 10,000 units (100 mg.) intravenously every 6 or 8 hours, for the first two days. Estimation of clotting time which should be prolonged to 2½ times normal may be done. If haemorrhage occurs it can be controlled by 100 mg. protamine sulphate IV.

(b) *Drugs which inhibit prothrombin formation*—take at least 48 hours to produce satisfactory effect. (i) *Phenindione* (Dindevan) 150-200 mg. on first day, 100 mg. on second, maintenance dose 50 to 100 mg. daily. (ii) *Warfarin sodium* (Marevan)—25-40 mg. orally as the initial dose, maintenance dose varies from 5 to 15 mg. daily. (iii) *Nicoumalone* (Sinthrome)—Synthetic compound of coumarin type. Dose 8-16 mg. on first day, 4-12 mg. on second day. Maintenance dose—must be individualised by repeated laboratory estimations of prothrombin time which should be maintained about 2½ times that of normal or prothrombin index which should be kept around 25 to 30 per cent of normal.

*Precautions*—A close watch must be kept for evidence of skin purpura, haematuria or at times melena. If haemorrhagic tendency develops stop the drug and give Vitamin $K_1$ 10-20 mg. by mouth or IM., or for dangerous haemorrhage 10-20 mg. IV.

*Long-term therapy*—Anticoagulants can be continued for upto 2 years with adequate prothrombin time control.

9. FIBRINOLYTIC AGENTS : for thrombolytic treatment. (i) IV Streptokinase 250,000 IU in 50 ml. 5% glucose administered over a 20-minute period. Maintenance dose 100,000 IU hourly (120,000 IU of Streptokinase dissolved in 50 ml glucose over 12 hours followed by same dose over next 12 hours.) Oral anticoagulant started simultaneously. (ii) Intra-coronary thrombolysis with streptokinase.

10 **Management of complications**—

(a) LV FAILURE—Frusemide 40 mg. IV, repeated as necessary. Oxygen and aminophylline. Digitalis should be used carefully. Vasodilator drugs especially in patients with normal or raised systolic B.P. in order to reduce afterload—sodium nitroprusside, pra-

(3) Acute bloody diarrhoea accompanied by rapid progression to a fulminant colitis. (4) Systemic symptoms of fever, sweating, anorexia, nausea, vomiting, and weight loss.

SIGNS: (1) Tenderness over affected colon. (2) Anaemia. (3) Finger clubbing in long-standing cases. (4) Tender, distended abdomen with diminished bowel sounds in fulminant disease.

EXTRAINTESTINAL MANIFESTATIONS:

1. *Related to disease activity*—(a) Aphthous stomatitis. (b) Erythema nodosum. (c) Pyoderma gangrenosa. (d) Eye complications—Conjunctivitis, episcleritis, uveitis.

2. UNRELATED TO DISEASE ACTIVITY—(a) Sacroileitis. (b) Ankylosing spondylitis.

**Complications:**

1. *Local*—Acute dilatation, perforation and massive haemorrhage. 2. *Carcinoma of colon.* 3. *Perianal disease*—Fissure in ano.

**Diagnosis:**

1. *Stool examination*—to exclude amoebiasis.

2. *Sigmoidoscopy and rectal biopsy*—The appearances can be graded as—(a) Mild: hyperaemia and oedema. (b) Moderate: Granular mucosa with contact bleeding. (c) Severe: Ulceration, spontaneous bleeding.

3. *Barium enema*—Diminished length, calibre and distensibility of colon. Superficial ulceration and absence of normal mucosal pattern in evacuation films.

4. *Colonoscopy*—not necessary for diagnosis but may be required to establish nature of stricturing or polypoidal lesions seen radiologically.

**Differential Diagnosis:**

| | *Ulcerative colitis* | *Crohn's disease* |
|---|---|---|
| *Cl. Fs.* | | |
| Bloody diarrhoea | Common | Not so common |
| Abdominal lump | Rare | Common |
| Perianal disease | Uncommon | Frequent |
| Signs of malabsorption | Never | Frequent |
| *Radiology* | | |
| Distribution | Continuous | Segmental |
| Mucosa | Fine ulceration | 'Cobblestones' |
| | Double contour | 'Rose-thorn' ulcers |
| Strictures | Rare | Common |

used to potentiate action of vasopressors Hydrocortisone 100 mg. or dexamethasone 4 mg. IV every 6 hours. (ix) *Vasodilator therapy*—may help by reducing overload. (x) *Mechanical assistance*—by aortic balloon counter-pulsation A non-occluding balloon is introduced into the aorta from femoral artery and is inflated with helium in phase with the cardiac cycle. Inflation occurs during period of ventricular diastole and deflation in ventricular systole. Aim is to reduce ventricular systolic pressure and hence the myocardial oxygen requirement and thereby augment coronary blood flow.

(d) ARRHYTHMIAS—

*Sinus bradycardia*—should be corrected if it is responsible for hypotension, cardiac failure or ventricular ectopic rhythms Atropine 0.6-1.2 mg. subcut. or IV., may be repeated after 2-4 hours If it fails isoprenaline 2-4 mg. IV in 500 ml. dextrose or atrial or ventricular pacing.

*Ventricular ectopic beats*—Treatment should be started if they are more than 5/min., occur in pairs, are multiform or of the R on T variety. (See p. 114).

*Ventricular tachycardia*—If no immediate response to lignocaine, DC shock should be employed. (See p. 121).

*Atrial fibrillation or Atrial flutter*—Digitalis to slow heart rate. If rate does not fall to 100 or below, propranolol can be added. If unsuccessful within 30 minutes DC shock may be necessary. Following reversion to sinus rhythm patient should be kept on digitalis for few days

*Disorders of conduction*—All forms of AV block are more common with inferior infarction than with anterior infarction. (i) *First degree heart block*—No treatment necessary but patient should be monitored because progress to more advanced block often occurs (ii) *Second degree and complete heart block*—(a) Atropine 0 6–1.2 mg. IV may be effective in early stages. (b) Isoprenaline 2–5 mg. IV in 500 ml. dextrose adjusted to keep heart rate between 70–100/min. (c) Pacemaker treatment—Electrical pacemaker set at about 80/min. when shock or failure are apparently due to bradycardia. For patients in good general condition pacemaker can be kept in reserve and set at a rate of 40/min. so as to operate if asystole develops. The elec-

7. *Symptomatic treatment*—(i) Diarrhoea—Codein phosphate upto 180 mg. daily or diphenoxylate (Lomotil) 5 mg. q.d.s. (ii) Anaemia—Oral iron if patient can tolerate it. Anaemia is also caused by chronic inflammation of ulcerative colitis and may not improve until disease activity is suppressed. (iii) General psychological support.
8. *Prevention of relapse*—Maintenance treatment with Sulphasalazine 0.5 gm. q.d.s. should be tried in patients with continuing low grade symptoms. Milk-free diet may be beneficial in some patients.

Surgery

(a) *In acute attack*—(i) No improvement in patient's condition after reasonable trial of intensive medical therapy. (ii) Perforation of colon (always). (iii) Acute dilatation of colon (usually). (iv) Massive haemorrhage from bowel (sometimes).

(b) *Chronic disease*—(i) Frequent disabling attacks or chronic continuous symptoms. (ii) Complications such as severe fistula-in-ano or recto-vaginal fistula. (iii) Carcinoma or colon or benign strictures.

(c) *Preventive*—To eliminate risk of subsequent carcinoma of colon in patients with extensive colitis for many years.

## REGIONAL ENTERITIS (Crohn's Disease)

**Definition:** A non-specific granulomatous inflammation involving sharply demarcated single or multiple areas of the intestine, and probably a non-specific pathological response to a variety of exciting agents.

**Etiology:** *Age*—Usually 20-60 years, may occur in children. *Sex*—more in females. *Cause*—unknown. May be caused by a small RNA virus. An L form of pseudomonas and mycobacterium kansasii have also been implicated.

**Clinical features:** depend on the site of disease.

1. *Small intestine*—1. Recurrent abdominal pain and diarrhoea. 2. Constitutional symptoms like fever and weight loss. 3. Malabsorption.
2. *Colon*—1. Symptoms resembling ulcerative colitis but rectal bleeding less marked. 2. Chronic perianal disease.
3. *Rectal involvement*—especially in elderly.
4. *Extraintestinal manifestations*—as in ulcerative colitis. Also hyperoxaluria and oxalate stones may develop and inflammatory process may involve the ureters leading to recurrent pyelonephritis, ureteric stenosis and hydronephrosis.

11. Drugs—Due to overdosage or sensitivity—digitalis, quinidine, procaine amide, adrenaline, potassium, local anaesthetics, saccharated iron oxide and rarely antibiotics.

**Clinical features:**

*Early*—(a) Loss of consciousness (b) Absence of pulsation in carotid, temporal or femoral artery.

*Late*—(a) Dilated pupils. (b) Unrecordable B.P. (c) Convulsions.

**Management:**

I. IMMEDIATE MANAGEMENT—

1. *Positioning*—Put patient in supine position on firm surface such as wooden board or on the floor.
2. *Establishment of airway*—Extend patient's head and clear the pharynx with a finger covered with gauze piece. Emergency tracheostomy may be necessary if a foreign body cannot be extracted through the mouth.
3. *Chest thump*—Strike the left upper chest forcibly with the fist. This may restart the heart if arrest is due to asystole.
4. *External cardiac massage*—Place the heel of the palm of the left hand over the xiphoid covering it crosswise with the right hand, and give firm compression with the weight of the body so as to push the sternum 1 to 1½ inches about 60 times per minute.
5. *Ventilation*—Apply mouth-to-mouth respiration concomitantly with external cardiac massage. (a) If *assistance not available*—carry out external compression for one minute and then give 3 to 4 mouth-to-mouth deep breaths. Face mask and oxygen or Ambu resuscitator can be used if available. (b) If *assistance available*—synchronise mouth-to-mouth respiration with every sixth compression.
6. *Drugs*—(a) *Soda bicarb*—50 ml. of 7.5% solution IV, repeat every 10 minutes. (b) *Adrenaline*—Dilute 1 ml. of 1 : 1000 solution to 20 ml. and inject 1-2 ml. IV or intracardially every 5-10 minutes.

II. DETERMINE HEART ACTION—by electrocardiogram—if above measures do not restore normal rhythm.

## Pancreatic Function Tests

**I. Direct tests:**

1. *Serum enzymes*—useful for diagnosis of acute pancreatitis.
2. *Faecal chymotrypsin*—Pancreatic disease is suggested if it is <75 ug/g of faeces. Useful screening test in children or in patients with steatorrhoea.
3. *Pancreatic scanning*—Pancreatic uptake of the isotope is reduced in most patients with chronic pancreatitis and pancreatic cancer. Abnormal scans may be seen in diabetes, liver disease and spastic colon syndrome, and after peptic ulcer surgery.
4. *Duodenal intubation tests*—
   (a) *Hormone test* (Secretin test)—The gastric and duodenal orifices of the tube must be carefully sited under fluoroscopic control. After IV injection of 2 CHRU Boots secretin per kg. body wt., duodenal juice is aspirated at 10 minute intervals for 60 minutes. The volume, pH and bicarbonate content is measured.
   (b) *Secretin-pancreozymin* (S-P) *test*—Duodenal juice is collected at 10-minute intervals for 30 minutes after IV injection of 2 CHRU of Boots secretin/kg. and for further 30 minutes after IV injection of 2 CHRU Boots pancreozymin/kg. The volume, pH, bicarbonate and enzyme concentrates of aspirates are measured.
   Interpretation—(i) In chronic pancreatitis fall in bicarbonate output and increase in lactoferrin concentration are characteristic. (ii) In pancreatic cancer enzyme secretion is more severely affected than bicarbonate. (iii) Tumours of head of pancreas cause fall in volume of the juice from obstruction of pancreatic and bile ducts.
   (c) *Meal test* (Lundh test)—Patient is given 300 or 500 ml of test meal containing corn-oil, skimmed-milk powder and dextrose. pH and pancreatic enzyme activity are measured in a pooled 2-hour collection of duodenal juice.

**II. Indirect tests:**

1. *Faecal fat and nitrogen*—Useful for judging patient's response to treatment with pancreatic extracts. Steatorrhea and creatorrhoea usually do not occur until pancreatic enzyme secretion falls to between 10 and 20% of normal.
2. *PABA/carbon 14 excretion index*—The fasting patient is given a flavoured drink containing 0.5 g BT PABA and 5 $\mu$ Ci $^{14}$C-PABA in 500 ml water to stimulate the pancreas and 25 g casein as a competitive substrate for chymotrypsin. Urine is collected for 6 hours PABA and $^{14}$C content are measured and expressed as a percentage of the respective ingested doses. The normal PABA/$^{14}$C excretion index is 0.76 Urinary PABA recovery provides index of pancreatic chymotrypsin secretion.
3. *Pancreolauryl test*—Fluorescein dilaurate is given orally with breakfast and the released fluorescein is measured in the urine in the next 10 hours The test is repeated after an interval of 24 hours using an equivalent dose of fluorescein alone. The ratio of fluorescein recovered in the two phases of the test (T/K ratio) is calculated Normal > 30 Interpretation—Ratio less than 20 suggests chronic pancreatic disease. The test assesses the combined functional efficacy of pancreatic esterases and bile salts and is useful in evaluating patients after gastric or biliary bypass surgery.

## Left Ventricular Failure

**Causes:**

1. *Primary L.V. myocardial failure*—Ischaemic heart disease, myocarditis, cardiomyopathy.
2. *Systolic (pressure) overload of L.V.* (when the heart has to pump against resistance, it is in systole that the strain is felt)—Hypertension, aortic stenosis.
3. *Diastolic (volume) overload of L.V.* (when the blood refills the ventricles, the predominant strain is confined to diastole)—M.R., A.R., V.S.D., P.D.A.
4. *Combined systolic and diastolic overload*—Aortic stenosis and regurgitation, aortic stenosis and mitral regurgitation.
5. *Left atrial failure*—Mitral stenosis, atrial myxoma, ball thrombus, congenital heart disease.

Common causes are— (a) Systemic hypertension. (b) Ischaemic heart disease. (c) Aortic valve disease. (d) Mitral regurgitation.

**Symptoms:**

1. DUE TO BACK PRESSURE—
   (a) *Dyspnoea*—(i) *Exertional dyspnoea*—due to pulmonary congestion. (ii) *Orthopnoea*—Effort tolerance becomes more and more reduced until dyspnoea is present at rest and respiratory distress develops on lying flat. Patient has less dyspnoea in upright position because of decreased venous return in upright position, decreased hypostatic pressure in the upper portion of lungs and increase in vital capacity. (iii) *Paroxysmal cardiac dyspnoea*—usually nocturnal. Reasons for nocturnal dyspnoea are—Reduction of vital capacity in supine position, depression of nervous system leading to reduced awareness during sleep which allows for too great a degree of pulmonary venous congestion and nocturnal reabsorption into the blood stream of tissue fluid from the lower body formed during day time. (iv) *Pulmonary oedema*—develops in severe attacks of paroxysmal cardiac dyspnoea. The patient is awakened from sleep with a feeling of extreme suffocation and sits up on the edge of his bed or a chair gasping for breath. There is profuse sweating and the skin becomes cold, pale and cyanosed. At times the dyspnoea may be wheezing in type. There is expectoration of frothy and sometimes pinkish sputum if pulmonary oedema develops. After 10 to 20 minutes

**Causes of tachycardia:**

*Regular rhythm*

1. Sinus tachycardia
2. Paroxysmal tachycardia
3. Atrial flutter

*Irregular rhythm*

1. Atrial fibrillation
2. Sinus tachycardia with ectopic beats
3. Atrial flutter with varying block
4. Paroxysmal atrial tachycardia with block

*Causes of irregular rhythm with normal heart rate:*

1. Multiple ectopics
2. Slow atrial fibrillation
3. Sinus arrhythmia

III. **Volume**—Corresponds to amplitude of the movement or lift of the vessel wall during the passage of the pulse wave. The volume depends on cardiac output.

PULSE OF LARGE VOLUME: in *high cardiac output states*—

(a) *Physiological:*
1. After exercise
2. Pregnancy
3. Warm humid environment.

(b) *Pathological:*
1. Anaemia
2. Fever
3. Thyrotoxicosis
4. Cor pulmonale
5. Cirrhosis of liver
6. Systemic A-V fistula
7. Systemic hypertension
8. Beriberi heart disease
9. Paget's disease
10. Obesity
11. Polycythemia vera
12. Idiopathic hyperkinetic heart syndrome
13. Renal disease: Acute nephritis, or chronic renal insufficiency
14. Carcinoid syndrome
15. Polyostotic fibrous dysplasia

PULSE OF SMALL VOLUME (Hypokinetic or weak pulse):
1. *Decreased cardiac output*—CCF, acute myocardial infarction, states of shock, cardiac tamponade, constrictive pericarditis, myocarditis, cardiomyopathy.

**Management:** of acute left ventricular failure:

1. *Position in bed*—Propped up.
2. *Morphine*—15 mg. (or pethidine 100 mg.) IM is effective in relieving bronchospasm and anxiety, removing some fluid from the lung by producing dilatation of systemic veins and decreasing the pulling action of the lungs which tends to increase return of blood to right heart by lessening the respiratory rate.
3. *Oxygen*—6-8 litres per minute by nasal catheter.
4. *Diuretics*—Frusemide 80 mg. IV.
5. *Aminophylline*—0.25 to 0.5 gm. IV. slowly relieves bronchospasm and improves myocardial contractility.
6. *Digitalis*—Digoxin (1 mg. IV), or lanatoside C (1.2-1.6 mg. IV) provided patient has not received digitalis in the previous fortnight.
7. *Phlebotomy*—may be helpful if venous pressure is high Removal of 500 ml of blood, or bloodless venesection by pumping up blood pressure cuffs on 3 of the 4 extremities to 40 mm Hg released for 5 min every 20 min in rotation.
8. *Vasodilators*—Sodium nitroprusside 20-30 mcg/minute IV if systolic B P. is more than 100 mm Hg.
9. *Ventilation*—Intubation and positive pressure ventilation if patient is resistant to treatment The raised intrathoracic pressure reduces venous return to the heart and leads to a shift of fluid from the lungs to the systemic venous system.

## Right Ventricular Failure (Congestive Cardiac Failure)

**Causes:**

1. *Primary R.V. myocardial failure*—Rare, e.g, myocarditis. cardiomyopathy, high output failure such as beri-beri.
2. *Systolic overload of R.V.*—(a) Preceding LVF—Commonest cause of right ventricular failure is preceding chronic left ventricular failure. (b) Chronic cor pulmonale. (c) Pulmonary hypertension, rarely primary. (d) Disease of right heart such as PS.
3. *Diastolic overload of R.V.*—A.S D., rarely TR.
4. *Restriction of R.V.*—Localised constrictive pericarditis, endomyocardial fibrosis.
5. *Right atrial failure*—due to isolated tricuspid stenosis, atrial myxoma or thromosis, or rarely localised constrictive pericarditis

**Symptoms:**

1. Due to inadequate blood supply to the tissues—Weakness, fatigue, and decreased urinary output resulting in fluid retention and oedema.
2. Due to inability of the heart to empty properly—Resulting in increased venous pressure and congestion of tissues.

2. LARGE BOUNDING PULSE—A large pulse wave means a high pressure associated with an increased flow and is seen in hyperkinetic circulatory states. A very large, bounding pulse of the *water hammer or collapsing* variety is usually associated with an increased stroke volume of L.V., a wide pulse pressure and a decrease in peripheral resistance. The pulse strikes the palpating finger with a rapid forceful jerk and quickly disappears. It is described as having a water hammer quality because of its sudden impact and a collapsing quality because it falls away so rapidly. The effect is accentuated if the pulse is examined with the patient's arm elevated because the radial artery is then in more direct line with the outflow stream from the aorta. The collapsing pulse is caused by the artery suddenly emptying as some of the blood flows back from the aorta into the ventricle and may occur in any condition with a large pulse pressure and low diastolic pressure. It indicates a low filling resistance in the reservoir into which the left ventricle pumps its contents.

*Causes of waterhammer pulse*—(i) *Aortic run off into heart*—Aortic incompetence, rupture of sinus of Valsalva into a cardiac chamber. (ii) *Aortic run off into pulmonary arteries—P.D.A.*, aortopulmonary window. (iii) *Aortic run off into peripheral vessels*—(a) Physiological—Hot bath, alcohol, pregnancy. (b) High output states—Anaemia, thyrotoxicosis, beriberi, anoxic cor pulmonale, liver cirrhosis. (c) Arteriovenous fistulae—Vascular malformations, trauma, Paget's disease. (d) Extreme bradycardia —A-V block.

3. TWICE BEATING PULSE—

(a) *Dicrotic pulse*—The double beat is produced during diastole by an accentuated, palpable dicrotic wave and is likely to be present when peripheral resistance and diastolic pressure are low as in fevers. Aortic regurgitation, mild or moderate may be associated with dicrotic pulse.

(b) *Anacrotic pulse*—Rarely the anacrotic notch in severe aortic stenosis may be so marked that it is possible to feel the initial portion of the pulse wave and the main wave as separate waves. This is usually felt in the carotid artery.

(c) *Pulsus bisferiens*—The first systolic peak of the pulse (percussion wave) is followed by a second late positive pulse wave (tidal wave). Felt in functional hypertrophic subaortic

(iii) Slowing of heart by direct action on heart muscle and reflexly through the vagus.

*Indications*—(a) *Cardiac failure*—both congestive and left ventricular. (b) *Dysrhythmias*—Atrial fibrillation, atrial flutter, supraventricular paroxysmal tachycardia, supraventricular ectopics. (c) *As a therapeutic test*—when it is uncertain whether or not there is some degree of cardiac failure as in old persons with slight dyspnoea on exertion.

*Contraindications*—(a) Sensitivity—very rare. (b) High output failure may not benefit. (c) Recent embolism. (d) Partial heart block. (e) Multifocal ventricular ectopic beats with myocardial ischaemia. (f) Obstructive cardiomyopathy. (g) Atrial flutter or atrial fibrillation with a slow ventricular response. (h) Patients with advanced renal disease. (i) Sinus bradycardia especially if heart rate is 50 or less.

*Increased sensitivity to digitalis*—(a) Acute myocardial infarction (b) Patients treated with large doses of ephedrine or quinidine. (c) Hypokalemia. (d) Renal insufficiency. (e) Hypothyroidism.

*Insensitivity or resistance to digitalis*—(a) Atrial fibrillation with MS (for no apparent reason). (b) Anaemia. (c) Thyrotoxicosis. (d) Pulmonary embolism. (e) SBE. (f) Pyrexia or toxaemia. (g) Active rheumatic carditis.

DOSAGE—*Initial dose*—

(a) *Rapid digitalization* (24 hours)—for (i) Acute congestive failure. (ii) Severe chronic failure. Single dose of 1.2 mg. of digoxin, then 0.5 mg. every 6 hours till digitalization.

(b) *Fairly rapid digitalization* (3 days)—For well developed but not urgent failure. Dose—0.5 mg. digoxin t.d.s. for 3 days.

(c) *Slow digitalization* (1 week)—For mild or moderate failure and for ambulant patients not under regular supervision. Dose—0.25 mg. digoxin t.d.s. for about seven days.

*Maintenance dose*—0.25-0.5 mg. digoxin daily for 6 days in a week.

*Routes of administration*—(a) Oral—Route of choice. Not more often than 6 hourly. (b) IV.—Indications—(i) Severe heart failure and urgent symptoms. (ii) Failure with very rapid ventricular rate (iii) Surgical or obstetrical emergencies. (iv) Development of pneumonia or other acute infection in patients with failure. Contraindication—Digitalis given during preceding fortnight.

## 2. CARDIAC ARRHYTHMIAS

### Classification :

**I. Disturbance of impulse formation :**

According to site of origin :

1. *Sino-atrial node*—Sinus bradycardia, sinus tachycardia, sinus arrhythmia, sinus arrest.
2. *Atria*—Atrial premature beats, atrial tachycardia, atrial fibrillation, atrial flutter.
3. *Atrio-ventricular node*—Nodal premature beats, nodal tachycardia, nodal rhythm.
4. *Ventricles*—Ventricular premature beats, ventricular tachycardia, ventricular flutter and fibrillation, ventricular escape.

**II. Disturbance of impulse conduction :**

1. S-A block.
2. A-V block.
3. Bundle branch block.

*Mechanism*—There are two fundamental mechanisms of arrhythmias—(1) Automaticity—An abnormal pacemaker overrides the normal pacemaker function at the SA node. (2) Re-entry —Re-entry arrhythmias are circular movements of electrical depolarization within cardiac tissue.

**Antiarrhythmic drugs :** Classification—

| *Drug* | *Uses in arrhythmias* | *Avg. daily dose* |
|---|---|---|
| CLASS I | | |
| (a) *Quinidine-like drugs* | | |
| Quinidine } | Atrial & Ventricular | 2 g |
| Procainamide } | | 2-4 5 g |
| Dysopyramide | Associated with WPW syn. | 400 mg. |
| (b) *Lignocaine-like drugs* | | |
| Lignocaine } | Vent. associated with acute myo. infarction | 3-6 g |
| Mexiletine } | | 750 mg |
| Diphenyl-hydantoin | Due to digitalis excess | 300 mg. |
| CLASS II | | - |
| *Beta-adrenoreceptor blocking drugs* | Ectopic beats | Variable |

Aprinox) 0.5 mg., Methylclothiazide (Enduron) 5 mg., Polythiazide (Nephril) 2 mg. (b) *Phthalimidines*—Duration of action more than 24 hours.—Chlorthalidone (Hygroton) 50 mg. twice weekly, Clorexolone (Nefrolan) 10 mg. daily. (c) *Quinazolinones*—Quinathazone (Aquamox) 50 mg. daily, Metolazone (Zaroxylin) 10 mg. on alternate days. (d) *Benzenedisulphonamides*—Mefruside (Baycaron) 50 mg. daily. (e) *Chlorobenzamides*—Clopamide (Brinaldix) 40 mg. daily (f) *Xipamid* 20 mg. daily.

3. POTASSIUM SPARING DIURETICS (Low efficacy diuretics)—(i) *Aldosterone antagonists —Spironolactone* (Aldactone)—Useful in patients resistant to benzothiadiazines. They produce loss of potassium instead of sodium with increased excretion of chloride. More useful in hepatic cirrhosis, and nephrosis. Dose 25 mg. q.d.s. Toxic effects—Pruritic cutaneous eruption, hypokalemia, azotemia, gynecomastia (ii) *Non-steroidal diuretics*—(a) *Triamterene* (Dytac)—Mild diuretic. Best used in combination with thiazide (Dytide) because it not only potentiates the sodium losing effect of thiazide but also reduces potassium loss. Dose 50 mg. t.d s. No serious toxic reactions. (b) *Amiloride*—Like triamterene should be given with thiazide. Dose 10 mg. b.d Gastrointestinal irritation including diarrhoea may occur.

**Complications of diuretic therapy:**

1. *Hypokalemia—Dangers*—(a) Precipitation of hepatic coma in patients with liver disease. (b) Increased sensitivity to digitalis which may result in digitalis intoxication. (c) Prolonged hypokalemia can cause renal and cardiac damage. *Symptoms*—Tiredness, weakness, polyuria or nocturia. *Management*—Potassium chloride in solution (may cause nausea) 1.5 gm. t.d.s., or slow-release preparation (slow-K) containing 600 mg. potassium chloride per tablet, 6-8 tablets daily. Ideally potassium supplement should be given on the days when patient is not on diuretic since they are then more likely to be retained. High dietary potassium (fruit juices. bananas, coconut water, instant coffee) may be enough if small doses of diuretics are used.

2. *Hypovolemia*—may occur with potent diuretics like frusemide. Physical signs of blood volume deficiency include fatigue, lightheadedness, hypotension, and increasing azotemia, and in the elderly acute circulatory collapse may be the first sign.

3. *Hyponatremia*—Seen in long-standing CCF and advanced cases of hepatic cirrhosis. Serum sodium may be less than 120 mEq/l (120 mmol/l). Hyponatremia with oedema and ascites is due to ineffective excretion of water with consequent dilution of the plasma. *Management*—Restrict diuretic therapy to 3



Fig. 2.2 Sinus tachycardia. Rate 120 per minute.

**Sinus arrhythmia:** Sinus rhythm with periodic variations in the heart rate usually related to respiration. The heart rate increases on inspiration and slows at the height of inspiration and during expiration. (Fig. 2.3). When the breath is held the arrhythmia disappears. It is a normal phenomenon and depends on the respiratory variations in vagal tone *inhibiting* the S-A node. This *phasic* type of sinus arrhythmia is common in children and athletes and is also seen in some old people. There is a rarer nonrespiratory variety.

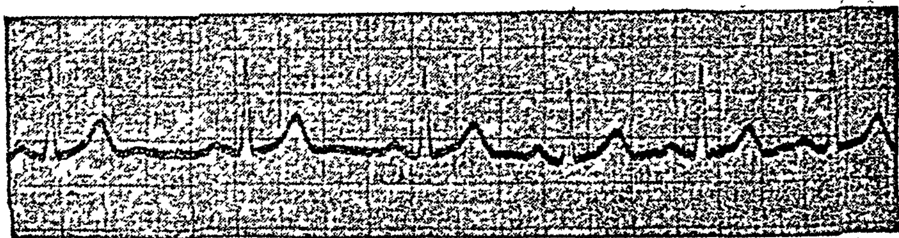


Fig. 2.3 Sinus arrhythmia.

**Sinus arrest (Sino-atrial standstill):** A condition resulting from momentary failure of the S-A node to initiate an impulse. It is a failure of impulse formation rather than a failure of impulse propagation. ECG—One or more PQRST complexes are dropped (Fig. 2.4). If the pause is too prolonged a lower centre may produce one or more escape beats. The P-P interval during the block is not a multiple of the normal P-P interval. Sinus arrest usually occurs in patients with increased vagal tone; it may also be due to digitalis or quinidine toxicity. Diagnosis suspected if dropped beat at the wrist as well as at apex.

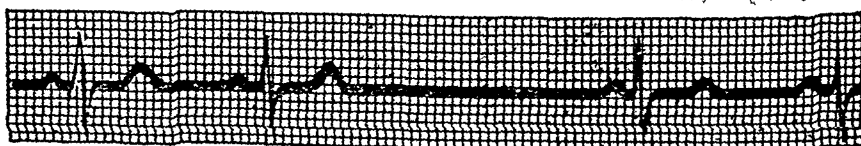


Fig. 2.4 Sinus arrest. A pause during which a PQRST complex is dropped.

VI. **Mechanical and therapeutic measures**—

1. *Oxygen*—Indications—(i) Failure complicated by pulmonary lesions like infarction, oedema or pneumonia. (ii) With acute coronary thrombosis. (iii) Secondary to lung disease like emphysema. (iv) Patients with persistent congestion of lungs.

2. *Phlebotomy*—Removal of about one pint of blood in low output failure in the absence of anaemia is a useful emergency measure when there is extreme elevation of venous pressure. Contraindications are constrictive pericarditis, pulmonary embolism and high output failure.

3. *Local paracentesis*—Removal of fluid if ascites or hydrothorax causing disagreeable oppression. Acupuncture for obstinate oedema of legs. The legs are kept dependent for a day or two and about a dozen punctures are made in each leg using Southey's tubes.

4. *Production of therapeutic myxoedema*—Euthyroid patient with refractive heart failure may benefit from production of hypothyroidism by antithyroid drugs or radioactive iodine.

5. *Peritoneal dialysis*—may be used as a means of removing fluid temporarily in the desperately ill patient or refractory failure.

6. *Physical therapy*—Massage of arms and legs to maintain peripheral circulation and prevent phlebothrombosis. Gentle passive or active exercises during convalescence.

VII. **Control of reversible factors**—e.g. anaemia, thyrotoxicosis, SBE, lung infection, hypertension, or surgical correction of congenital or acquired lesion.

**Refractory heart failure:**

*Causes*—(1) Underlying condition amenable to medical or surgical treatment e.g. hypertension, MS or AS, masked thyrotoxicosis, SBE, constrictive pericarditis, vitamin B deficiency. (2) Precipitating causes such as severe anaemia, pulmonary infection, cardiac arrhythmia or recurrent pulmonary emboli. (3) Complications of therapy such as digitalis toxicity or electrolyte imbalance.

## 11. SHOCK

**Definition**—*Shock may be defined as a life-threatening state* in which there is a serious reduction of cardiac output with inadequate perfusion of organs such as kidneys, brain and liver. It can occur either because the function of the heart itself is impaired, or because the heart is inadequately filled.

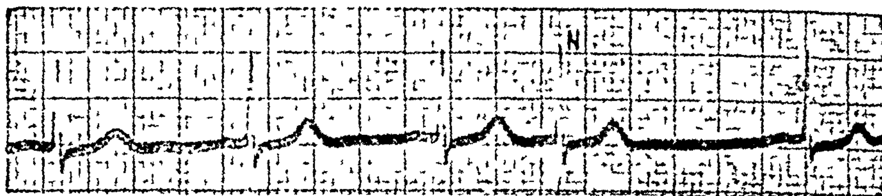



Fig. 2.6 Nodal ectopic beat. There is no P wave before the premature beat

3. **Ventricular:**

*Causes*—(a) Idiopathic. (b) Organic heart disease—Ischemic heart disease, hypertensive heart disease, myocarditis, any cause of ventricular hypertrophy or irritation. (c) Drugs—Digitalis, quinidine, procaine amide, amphetamine, caffeine, thyroxine, adrenaline, nicotine. (d) General—After major illness, or surgery, physical unfitness.

*E.C.G.*—QRS wide, and notched or slurred. T wave in opposite direction to QRS. P wave hidden in or follows QRS. Shape varies if multifocal. Fully compensatory. (Fig. 2.7).

*Clinical significance*—(i) Idiopathic and may occur in health. May be caused by emotional upset, may occur during pregnancy. (ii) Effect of exercise—(a) If abolished by exercise tachycardia they are usually considered benign. (b) If induced by exercise they may suggest presence of coronary insufficiency. (c) In acute myocardial infarction—(i) Their presence presages ventricular tachycardia and fibrillation if premature cardiac contraction occurs early in cardiac cycle with interruption of T wave (R on T), or in bursts or salvoes of 2 or more, or if they are of multifocal configuration, or if they occur more often than 5 per minute. (ii) In left bundle branch block it may be the only ECG evidence of cardiac infarction.

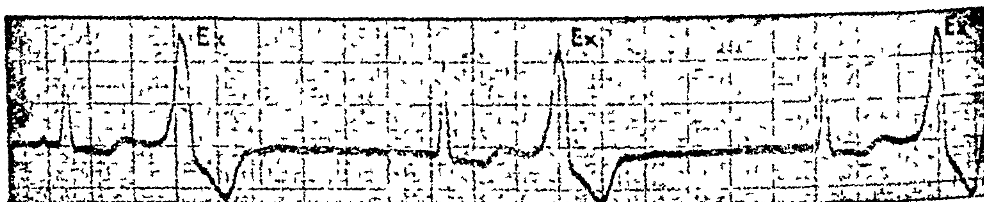



Fig 2.7 Ventricular ectopic beats causing coupling or bigeminy.

4. *Interpolated extrasystole*—Occurrence of three beats in rapid succession in the time normally occupied by two and without a long pause. Common with ventricular ectopic beats
5. *Fusion Beats*—QRS complex intermediate in shape between a normal and aberrant QRS and preceded by a P wave.

2. *Signs of disordered function of vital organs*—(a) *Impaired renal function*—Oliguria or anuria. (b) *Impaired cerebral function*—Restlessness in early stages, later confusion, apathy or coma. (c) *Impaired hepatic function*—Progressive metabolic acidosis. (d) *Impaired coronary perfusion*—Coronary insufficiency.
3. *Shock lung*—This is a term which is used ot describe diffuse parenchymal alveolar haemorrhagic consolidation and oedema associated with states of profound shock. It usually appears within 1-3 days of the onset of shock with initially tachypnoea, hyperventilation and crepitations, followed usually by cyanosis. These patients are susceptible to a number of pulmonary insults or hazards such as inhalation of vomit and secretions, fat embolism, thromboembolism, pneumonia, septicemia, oxygen toxicity and pulmonary oedema, with ultimate deterioration of respiratory function and death.

**Management:**

1. *Determination of type of shock and treatment of causative factor*—(a) Initial treatment depends on whether shock is due to impaired cardiac function (raised CVP), or inadequate cardiac filling (CVP usually reduced). (b) Underlying disease should be treated e.g. ligation of bleeding vessel, pericardial aspiration for cardiac tamponade, insulin for diabetic coma, antibiotics if bacteremia, hydrocortisone for Addisonian crisis.
2. *Posture*—Head low position (15°-20°) to increase filling pressure of right ventricle and raise cardiac output.
3. *Relief of pain*—with morphine preferably IV to avoid delay in absorption.
4. *Oxygen*—in high concentration, and positive pressure ventilation.
5. *Transfusion or infusion*—when central venous pressure is normal or reduced—(a) *Blood*—for shock due to haemorrhage. (b) *Saline or plasma*—if hematocrit is over 55% and if fluid has been lost from extensive burns or dehydration. (c) *Dextran*—Low molecular weight dextrans are of value in cardiogenic shock or when the flow properties of the blood are impaired e.g. severe dehydration (d) *Mannitol*—should be given early in septicemic shock because it delays acute renal failure which these patients are prone. Not more than 200 ml. should be given if patient is not dehydrated or does not pass more than 50 ml. urine in the first hour after infusion. When fluids are given very rapidly

pics. (v) Potassium chloride 1 g. bd by mouth used for ventricular ectopics.

4. *If due to acute myocardial infarction*—If factors such as bradycardia, digitalis or isoprenaline therapy or faulty electrical pacing can be eliminated start with Lignocaine 50-100 mg. IV over 5-10 minutes, followed by 1-2 mg./min by IV infusion for total dose of 1-2 gm./day. Infusion is continued for 24-48 hours before changing to oral procaine amide 500 mg. 4 hourly for 3-6 weeks. If lignocaine fails to control the arrhythmia, Procainamide 100 mg. IV in 5 minutes followed by 2-6 mg./minute IV. Later it may be given orally 500 mg. q.d.s. in order to maintain adequate blood levels.

## Atrial Fibrillation

**Causes:**

*Chronic (established) atrial fibrillation*—(1) Rheumatic heart disease notably mitral valve disease. (2) Ischemic heart disease. (3) Hypertensive heart disease. (4) Thyrotoxicosis (5) 'Lone' mostly in those over 50. (6) Lung disease acute and chronic. (7) Pericarditis including constrictive. (8) A.S.D. (9) Active rheumatic carditis. (10) Miscellaneous—Digitalis toxicity, following surgery of mitral valve, trauma.

*Paroxysmal atrial fibrillation*—(1) Same as for established atrial fibrillation. (2) Idiopathic. (3) Alcohol.

*Self limited attacks*—(1) Thoracotomy. (2) Acute cardiac infarction. (3) Acute infection pulmonary or generalised. (4) Acute pericarditis. (5) Intoxication by alcohol, caffeine, amphetamines, thyroxine, adrenaline.

**Symptoms:**

1. *Few or no symptoms*—If no underlying heart disease, or slow fibrillation.
2. *Due to rapid heart rate*—Palpitation or thumping in chest.
3. *Due to fall in cardiac output and systemic pressure*—(a) Anginal pain because of lowered coronary perfusion if coronary insufficiency. (b) Weakness, dyspnoea and cough due to heart failure. (c) Syncope or focal neurological symptoms such as hemiparesis, aphasia, etc. if cerebral artery narrowing.
4. *Symptoms due to embolism*—if rheumatic mitral valve disease.

**Signs:**

1. *Irregularly irregular rhythm*—With ventricular rate usually between 100-200 beats per minute. Slower ventricular rate in old age, digitalis therapy or lone atrial fibrillation.

9. *Vasodilators*—Raised peripheral resistance limits output of left ventricle and affects distribution to essential organs These drugs cause fall of B. P. and must be used only after adequate replacement of circulating blood volume. (a) *Phenoxybenzamine*—useful in patients with raised venous pressure who are unable to achieve adequate circulation in spite of a catecholamine and correction of acidosis. Dose—Aliquots of 5 mg. every 5-10 minutes with continuous observation of CVP. Total dose of 10-20 mg. may be sufficient to initiate improvement in circulatory state. (b) *Isoproteronol*—2-3 mg. IV in 1000 ml. of 5% dextrose.
10. *Corticosteroids*—in septic and cardiogenic shock.
11. *Heparin*—may prevent intravascular clotting especially in endotoxic shock and hemolytic uremic syndrome accompanying shock.

## 12. HYPERTENSION

**Definition:** Arterial pressure, like most physiological measures, is variable, but a blood pressure above 140/90 mm. Hg. is considered abnormal. Hypertension can be primary or essential when there is no obvious precipitating factor, or the much less common secondary hypertension where there is some identifiable cause.

**Causes:**

1. *Essential hypertension.*
2. *Renal*—(i) *Severe unilateral renal disease*—Hydronephrosis, stenotic or aberrant renal artery, renal infection, trauma, unilateral pyelonephritis, Wilm's tumour. (ii) *Bilateral renal disease*—Chronic pyelonephritis, glomerulonephritis, analgesic nephropathy, polycystic disease of kidney, enlarged prostrate, urethral stricture with bilateral hydronephrosis, systemic disease involving kidneys e.g. polyarteritis nodosa, disseminated lupus erythematosus, diabetes, amyloidosis, systemic sclerosis. (iii) Kidney transplantation.
3. *Endocrine*—(i) Acromegaly. (ii) Cushing's syndrome. (iii) Primary aldosteronism. (iv) Pheochromocytoma.
4. *Cardio-vascular*—(i) Coarctation of aorta. (ii) Raised systolic pressure in aortic regurgitation or complete heart block. (iii) Middle aortic syndrome.
5. *Cerebral*—Increased intracranial pressure, encephalitis, bulbar poliomyelitis, cerebral trauma
6. *Toxic*—Pregnancy toxemia, steroids, oral contraceptives, lead.
7. *Polycythemia vera*

4. *Anticoagulants*—when electroversion is planned, or rheumatic fibrillation of recent onset because of risk of embolism.

5. ELECTROVERSION—has largely replaced quinidine.

(a) *Preparation*—A.F. is first controlled with digitalis, which should be stopped 48 hours before conversion. Anticoagulants should be given to patients with previous arterial emboli, and those with mitral valve disease for atleast 14 days prior to conversion. Quinidine 0.4 g. orally every 6 hours is begun 24 hours before the cardioversion and is continued following cardioversion if sinus rhythm is achieved, otherwise quinidine is discontinued.

(b) *Indications*—(i) Those incapacitated by their cardiac disease (angina, severe congestive failure) despite intensive therapy. (ii) Deterioration of cardiac status following appearance of A.F. (iii) Repeated embolization despite anticoagulation. (iv) A.F. of less than six months duration. (v) Persistence of A.F. for more than 2 weeks after mitral valvotomy. (vi) Persistence of A.F. complicating thyrotoxicosis after patient is rendered euthyroid. For patient treated surgically if arrhythmia persists after 3rd week. (vii) Persistence of A.F. associated with infections. (viii) Paroxysmal A.F. following myocardial infarction if not controlled with digitalis and propranolol. (ix) If digitalis fails to control palpitation, or if unpleasant side effects prevent adequate digitalisation.

(c) *Contraindications*—(i) Patient who cannot tolerate quinidine which will be needed to help in preventing the return of the arrhythmia if conversion attempt is successful. (ii) Age over 70. (iii) Considerable cardiac enlargement especially of left atrium. (iv) A.F. with complete or nearly complete AV block. (v) Patient who is to undergo mitral valve surgery as A.F. is likely to recur during operation or shortly afterwards. (vi) Patient with repetitive paroxysmal atrial tachycardia or atrial flutter refractory to drug treatment predating A.F.

6. *Quinidine—Indications*—(i) Lack of facilities for electrical cardioversion and where benefit to be derived from restoration of sinus rhythm outweighs the risks involved. (ii) Post-cardioversion prophylaxis. *Contraindications*—(i) Sensitivity to quinidine. (ii) Patients whose rhythm has been reverted many times but who have repeatedly relapsed to fibrillation. (iii) Presence of complete heart block or bundle branch block. *Method*—(i) Patient should be fully digitalised in order to prevent more rapid ventricular rate. (ii) Give a test dose of 0.2 gm. of quinidine to determine whether hypersensitivity

sensitise the renin release mechanism by causing renal arteriolar constriction. (b) *Carotid sinus receptors*—The receptors which signal arterial pressure are in some way reset in hypertension so that they tend to fix the pressure at a high level. Hypertension is reported following removal of carotid sinus nerves for treatment of asthma, and carotid sinus nerve stimulation can be effective longterm treatment for resistant hypertension.

5. *Psychological factors*—(a) Moderately sustained hypertension has been produced in rats subjected to subthreshold stimulation of electrodes in the 'defense' area of the hypothalamus. Experimental crowding of mice was found to alter the social pattern so that one of the male mice was forced to become dominant. The dominant mouse developed hypertension. (b) Men were found to react to mental stress by increased excretion of catecholamines.

**Symptoms:** (1) *No symptoms*—Uncomplicated hypertension is symptomless. (2) *Headache*—may occur in patients with very high arterial pressure, or hypertensive encephalopathy. The headache is usually occipital and present on waking.

**Signs:**

1. *Blood pressure*—The level of diastolic pressure is important and patients can be grouped accordingly—(a) Mild: less than 100. (b) Moderate: 100-120. (c) Severe: 120-140. (d) Gross: More than 140.
2. *Peripheral arterial vessels*—Pulse may be bounding and radial artery hard (whip cord). Locomotor brachials may be seen. Kinked carotid artery on right side in women (with kyphoscoliosis).
3. *Heart*—Heaving cardiac impulse. Aortic second sound accentuated and ringing. Murmur of functional MR may be heard at apex, and ejection click and systolic murmur in aortic area due to dilatation of aorta.
4. *Optic fundi*—Retinal changes have prognostic significance and correlate well with the clinical course. Grade 1: Mild arteriolar narrowing. Grade 2: More marked narrowing and arteriovenous nicking or compression. Grade 3: Flame-shaped or circular haemorrhages and cotton wool exudates. Grade 4: Any of the above plus oedema of the disc.
5. *E.C.G.*—LV enlargement with or without T inversion in I, aVL, $V_5$, $V_6$.

2. CARDIOVERSION—(a) *Pharmacological with digitalis*—1 mg. of digoxin followed by 0.5 mg. 6 hourly, then reduced to minimum necessary to control ventricular rate. It may produce conversion of flutter to fibrillation which may revert spontaneously to normal rhythm; or continuation of the flutter with increase in the degree of AV block and corresponding slowing of ventricular rate.
   (b) *Electrical cardioversion*—More rapid and safer way of restoring sinus rhythm. Direct current. QRS-synchronised shocks are used. Patients with increased risk of intracardiac thrombi (atrial enlargement, valvular disease especially MS, or reduced cardiac output) should be treated with oral anticoagulants atleast one week before cardioversion is attempted.
3. *Propranolol*—may be used in patients with rapid rate. 0.5 mg. IV at interval of 15 minutes, total dose not to exceed 2 g. Digitalis or cardioversion can then be employed to achieve sinus rhythm.
4. *Atrial pacing*—may convert atrial flutter to sinus rhythm Especially suited to patients who are a poor risk for anaesthesia used in giving DC shock such as elderly patients, those with acute myocardial infarction or advanced obstructive lung disease.

*Prevention of recurrence*—Quinidine 0.3 gm. q.d.s. or sustained release tablets in a dose of 0.8-1.2 gm./day, or Disopyramide 100–200 mg t.d.s.

## Paroxysmal tachycardia

**Definition:** Presence of six or more successive ectopic beats.

**Classification:**

1. Supraventricular. (a) Atrial. (b) A-V junctional (Nodal).
2. Ventricular.

### SUPRAVENTRICULAR TACHYCARDIA

**Causes:**

1. Idiopathic in majority. 2. As for atrial ectopics—notably rheumatic and ischaemic heart disease. 3. Digitalis intoxication. 4. Pre-excitation (Wolff-Parkinson-White) syndrome. Occurs in more than 50% of patients. 5. Short PR interval with normal QRS complex (Lown-Ganong-Levine syndrome) are also more prone to bouts of supraventricular tachycardia.

**Symptoms:**

(a) *Local*—Precordial discomfort or anginal pain. Disagreeable fluttering over precordium. Fullness in neck. Pounding of vessels in head, arms, abdomen and legs.

| *Drug and Mode of action* | *Daily Dose* | *Side effects and comments* |
|---|---|---|
| **I. Decreased sympathetic activity** | | |
| (1) *Central action on vasomotor centre* | | |
| (a) Rauwolfia serpentina Reserpine | 0 5-1 mg. | Depression, sedation, bradycardia, nasal stuffiness, increased gastric secretion, diarrhoea. |
| Methoserpidine | 20-30 mg. | Not a potent hypotensive. |
| (b) Clonidine hydrochloride | 0.2-1.0 mg. | Diarrhoea, sedation, 'overshoot' hypertension on stopping treatment Useful for patients with migraine. |
| (2) *Inhibition of synthesis of pressor amines* | | |
| Methyldopa | 500 mg -2 0 g. | Drowsiness, depression, fluid retention, orthostatic hypotension, bradycardia, diarrhoea, autoimmune hemolytic anaemia, loss of libido Hepatotoxicity. Safe in pregnancy. |
| (3) *Adrenergic neurone-blocking agents* | | |
| Guanethidine (Ismelin) | 20-50 mg (Longer acting 24 hours) | Orthostatic hypotension, diarrhoea, bradycardia, impaired ejaculation, decreased renal function. |
| Bethanidine (Esbatal) | 30-200 mg. (Shorter action 4 hours) | |
| (4) *Blocking action of sympathomimetic amines* | | |
| (a) *Beta blockers* | | |
| *Non-selective* | | |
| Propranolol | 40-320 mg | Bradycardia, cardiac failure, agranulocytosis, purpura, depression, hallucinations, nausea, vomiting Bronchospasm in patients with asthma. |
| Oxprenolol | 80-320 mg. | |
| *Selective* | | |
| Metaprolol | 100-400 mg. | Particularly useful in patients with bronchospasm (asthma, bronchitis). |
| Atenolol | 100-200 mg. | |
| Acebutolol | 400-800 mg. | |
| (b) *Alpha blockers* | | |
| Indoramin | 50-100 mg. | No tendency to tachycardia Slows heart rate May produce drowsiness and failure of ejaculation. |

3. *Drugs*—
   (a) *Verapamil* (Isoptin) 5 mg. IV over 5 minutes. Can be repeated every 5 minutes until conversion occurs, or total dose reaches 20 mg.
   (b) *Digitalis*—Digoxin 0.5 mg. followed by 0.25 mg. every 2 hours till effect or total dose of 1.5 mg., or 0.75 mg. IV. Contraindicated if patient is already on the drug, if 1 : 1 A-V block is present, if WPW syndrome is responsible, or if electroversion is contemplated.
   (c) *Other antiarrhythmic drugs*—Quinidine, procainamide, propranolol, diphenylhydantoin.
   (d) *B P. raising drugs*—Phenylephrine 0.5 mg. IV as bolus, or 5 mg. in 100 ml. 5% dextrose in water slowly IV. The systolic B.P. is raised to about 160-180 mm Hg, or noradrenaline 8 mg. in litre of 5% dextrose. If elevation of B.P. is ineffective carotid sinus pressure may be combined with this treatment.
4. *Electrical cardioversion*—if above measures unsuccessful, in urgent cases, or when differentiation from ventricular tachycardia is difficult because of bundle branch block Digitalis should be discontinued before cardioversion.
5. *Atrial pacing*—has the advantage of safety in patients who are receiving digitalis. Anaesthesia is not necessary.
6. *Endocavitary stimulation*—useful in certain refractory cases

**B. Prevention of recurrence:**

1. *General measures*—Use of sedatives and avoiding excess fatigue, emotional tension, excess alcohol, smoking, and stopping use of sympathetic drugs if any.
2. *Drugs*—Verapamil 80 mg. t.d.s. or Digoxin 0.25 mg. once a day, or Quinidine 0 2 g. q.d.s., or Propranolol 10-40 mg q.d.s.

## VENTRICULAR TACHYCARDIA

**Causes:**

1. Acute or chronic ischaemic heart disease.
2. Most of the causes of ventricular ectopics.
3. Idiopathic paroxysmal or intermittent variety rarely in youth.
4. Drug toxicity—Digitalis, *quinidine or sympathomimetic* drugs.

**Diagnosis**—See table of differential diagnosis of tachycardias.

| Drug | Dose & Route | Action Onset | Max. | Adverse effects |
|---|---|---|---|---|
| 3. Hydralazine | 10-15 mg | 10-20 min | 20-40 min | Tachycardia, angina, headache, nausea, vomiting |
| 4 Sodium nitroprusside | 100 mg/ml IV drip | <1 min | 1-2 min. | Confusion, psychosis, nausea, vomiting, headache, anaemia, agranulocytosis, thrombocytopenic purpura. |
| B. *Slow acting* | | | | |
| 1 Reserpine | 0 5-5 0 mg. IM | 1½-2 hrs. | 3-4 hrs | Sedation, Parkinsonian reaction, increased gastric acid secretion |
| 2 Methyldopa | 250-1000 mg IV | 2-3 hrs | 3-5 hrs. | Sedation |

2. EPISTAXIS—Nose packed with absorbent cotton soaked in adrenaline solution, cauterization after active bleeding has stopped or pressure fails to control bleeding. Nasal cavity pack if source of bleeding not accessible to cauterization.

3. L V. FAILURE—Digitalis and diuretics.

4. CEREBRAL HAEMORRHAGE—Rapid reduction of pressure with diazoxide or trimethaphen to prevent further bleeding.

5. DISSECTING ANEURYSM—Rapid reduction of B.P. Propranolol may be useful.

V. **Surgical treatment**—e g. Nephrectomy for unilateral renal disease Removal of pheochromocytoma. Sympathectomy if drug therapy fails in a young patient with malignant hypertension.

## INVESTIGATION OF A CASE OF HYPERTENSION

I. **History:**

1. *Age and type of onset*—(a) Gradual onset between 35 and 50 is typical of essential hypertension (b) Acute onset in children and young adults suggests acute glomerulo nephritis. (c) Moderate to severe hypertension in the young usually suggests chronic renal disease e g. chronic glomerulonephritis. (d) A sudden onset in middle or old age may indicate a reno-vascular cause.

2. *Family history*—may be positive in essential hypertension and polycystic disease.

**D.D. of regular tachycardia**

| | *Sinus tachycardia* | *Supraventricular tachycardia* | *Ventricular tachycardia* | *Atrial flutter with 2 1 block* |
|---|---|---|---|---|
| 1 Onset and termination | Gradual | Sudden | Sudden | May be sudden |
| 2 Heart disease | Absent | Often absent | Usually present | Usually present |
| 3 Heart rate | Rarely more than 160 | 160 or more | 160 or more | Usually 150 |
| 4. Jugular venous pulse: | | | | |
| (a) Rate compared to ventricular rate | Same | Same | Difficult to distinguish | Ventricular rate half of rate of flutter waves |
| (b) Cannon waves | Absent | Regular cannon waves may be seen | Irregular cannon waves | Regular cannon waves may be observed |
| 5. 1st heart sound | Constant | Constant | Variable intensity | Constant |
| 6 Carotid sinus pressure | Gradual slowing with gradual return to previous rate on release of pressure | No change or abrupt reversion to normal | No change | Abrupt slowing for few beats only |

7. *Fundus*—For changes and degree of hypertension.

8. Evidence of lead intoxication—A—Anaemia, B—Blue line on gums and basophilia, C—Colic and constipation, D—Dropped wrist, E—Encephalopathy, F—Faints, G—Gout, H—(H)optic atrophy.

III. **Investigations:**

A Routine tests—

1. *Urine*—Presence of albumin, casts and red cells suggests primary renal disease or malignant hypertension. More than 100,000 organisms per ml. is diagnostic of infection.

2. *X-Ray of chest*—For degree of cardiac enlargement. Rib notching and small aortic knob in coarctation

3. *Electrocardiogram*—to assess degree of LV enlargement.

4. *Glucose tolerance test*—to exclude diabetes or carbohydrate intolerance due to such other causes as pheochromocytoma, primary aldosteronism, or Cushing's syndrome.

5. *BUN or serum creatinine*—to diagnose gross impairment of renal function.

6. *Serum electrolytes and $CO_2$*—to detect hypokalemia and alkalosis caused by primary aldosteronism, Cushing's syndrome and other diseases.

B. Special tests—

1. INVESTIGATION OF RENO-VASCULAR HYPERTENSION—

(a) *Plain x-ray of kidneys*—A difference in size of the kidneys indicates possibility of renal vascular or parenchymal disease. Radio-opaque urinary calculi.

(b) *Intravenous urography* (IVU)—(i) May show unilateral or bilateral hydronephrosis, chronic pyelonephritis, or polycystic disease. (ii) Downward displacement or deformity of the upper pole of one kidney should suggest pheochromocytoma (iii) Renovascular obstruction is suggested by one or more of the following—(a) Reduction of kidney size more than 1.5 cm on left or 1.0 cm on right side. (b) Greater concentration of radio-opaque material on affected side when contrast material finally does appear. (c) Notching of the pelvis or upper ureter on the affected side by collateral vessels. A normal IV pyelogram does not exclude possibility of renal arterial obstruction.

(c) *Retrograde ureterography*—To exclude possibility of obstruction of lower urinary tract as cause of hypertension. If retrograde pyelogram shows normal anatomy but there is no excretion of the contrast medium by one kidney during IV pyelography, renal vascular obstruction on that side can be presumed. Micturating cystogram if pyelonephritis is suspected in order to exclude presence of vesico-ureteric reflux in females.

mg. over 2 hours. Then 0.5-1 mg/min. Once arrhythmia is controlled oral dose of 200 mg. 6-8 hourly.

7. *Disopyramide*—2 mg./kg. IV to total of 150 mg.

**Prevention of recurrence:**

Once arrhythmia is controlled, xylocaine IV infusion at the rate of 2-3 mg./min. is continued for several days. Then 3-4 times/day oral procainamide 250-500 mg., or quinidine 200-400 mg., or propranolol 10-40 mg., or Mexiletine 150-300 mg., or Disopyramide 100-200 mg. for 4-6 weeks.

**Differential Diagnosis of tachycardia:**

*Regular tachycardia*

1. Sinus tachycardia
2. Paroxysmal supraventricular tachycardia
3. Ventricular tachycardia
4. Atrial flutter

*See table on p.* 122

*Irregular tachycardia*

1. Sinus arrhythmia with tachycardia
2. Ectopic beats
3. Atrial fibrillation
4. Atrial flutter with varying block
5. PAT with block

*See table on p.* 123

## Heart Block

**Types:**

1. Sino-atrial block.
2. Atrioventricular block above division of Bundle of His.
3. A-V block at level of bundle branches.

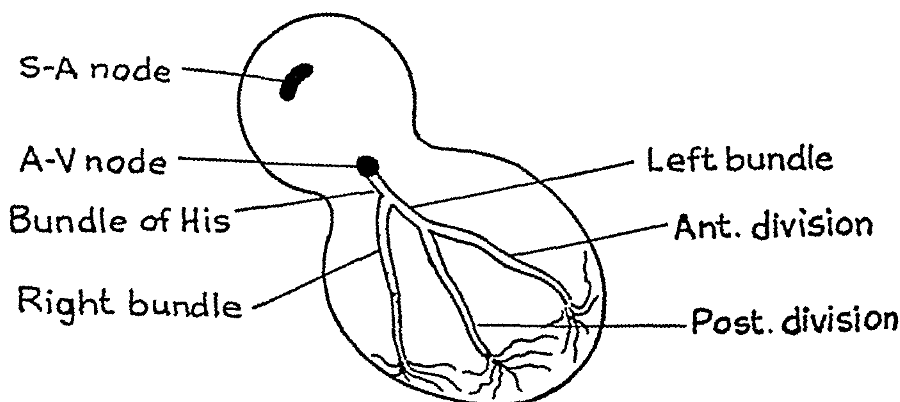



Fig. 2 13 The conducting system of the heart.

A. **Sino-atrial block**—

*Definition*—A condition in which the S-A node initiates an impulse but there is a block to the exit of the impulse from the S-A node to the atria.

overloading due to valvular, congenital, hypertensive, ischaemic heart disease or pulmonary pathology can be excluded.

## I. Acute Myocarditis

**Definition**—Acute damage to heart muscle by an infective agent.

**Etiology**—Acute myocardial inflammation may be due to:

1. *Infections*—(a) *Bacterial* (toxic)—e.g., Diphtheria, rarely pneumonia. (b) *Viral*—e.g., rubella, Coxsackie B infection, echoviruses, mumps, influenza.
2. *Parasitic*—Trypanosomiasis, toxoplasmosis.
3. *Immune disorders*—Serum sickness, allergic reaction to drugs such as sulphonamides, phenylbutazone, phenindione, etc. Wasp stings.
4. *Acute rheumatic fever.*
5. *Connective tissue diseases.*

**Clinical Features:**

*Symptoms*—Dyspnoea and sometimes precordial discomfort especially if associated pericarditis. Skeletal muscle pains in viral myocarditis.

*Signs*—Tachycardia, gallop or tic tac rhythm with signs of CCF. Arrhythmias such as ventricular extrasystoles or conduction disturbances especially in diphtheria.

**Investigations:**

1. *ECG*—ST-T changes, conduction defects and arrhythmias.
2. *X-ray chest*—Cardiomegaly with pulmonary congestion.
3. *Echocardiogram*—to exclude pericardial effusion and confirm poor LV function.
4. *Cardiac biopsy*—for histological diagnosis and to detect virus antibody or virus particles.

**Treatment:**

1. *Supportive measures*—Bed rest, diuretics for failure, antiarrhythmic drugs. Prophylactic demand pacemaker may be needed for AV block in diphtheria. Steroids in viral and rheumatic carditis.
2. *Specific therapy*—Antitoxin in diphtheria, antibiotics.

## II. Cardiomyopathies

**Definition**—A disease of cardiac muscle of unknown cause and association (formerly called primary cardiomyopathy). Heart muscle disease associated with disease elsewhere in the

cycle. (vi) E.C.G.—P-R interval more than 0.2 second (Fig. 2.15).

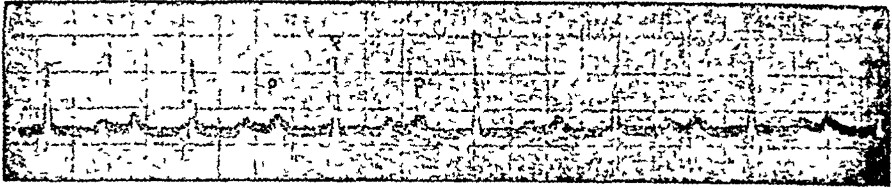


Fig. 2 15 First degree heart block. P-R interval almost 0.4 seconds

**II. Second degree block (Partial heart block)—**

*Causes*—Acute rheumatic fever, diphtheria, ischaemic heart disease, digitalis or viral infections.

TYPES OF PARTIAL HEART BLOCK :

(1) *Mobitz type I (Wenckebach phenomena)*—Gradual lengthening of P-R interval until a P wave is not followed by a QRS complex, the cycle then starts again. (Fig. 2.16) As A-V conduction worsens, less impulses are transmitted in each cycle and then Wenckebach period shortens Ultimately 2 : 1 A-V block may occur. Recognised at beside by—(a) Occurrence of dropped beat without preceding premature beat. (b) Intensity of 1st sound may be constantly faint or it may decrease in intensity over several beats.

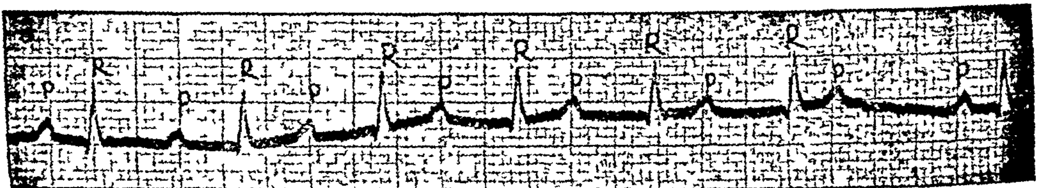


Fig 2 16 Progressive lengthening of P-R interval followed by "dropped beat" (Wenckebach phenomenon).

(2) *Mobitz type II (Intermittent type)*—(a) Regular rhythm with sudden pauses slightly less than two normal cycles. (b) Small atrial waves may be seen in the jugular vein during these pauses. (c) E C.G.—P-R interval remains constant but QRS complexes are dropped out intermittently (Fig. 2.17).

2. **Hypertrophic (obstructive) cardiomyopathy (HOCM)**—Reduced left ventricular cavity and presence of ventricular outflow tract obstruction.

*Clinical features*—(i) Familial incidence—A genetic factor is responsible. (ii) Symptoms—Dyspnoea, anginal pain, syncope, and palpitations. (iii) Signs—Jerky, ill-sustained pulse. Late systolic murmur due to both MR and outflow tract obstruction, maximal down left sternal edge, well heard at apex and radiating into axilla, 3rd heart sound may be heard. Reversed split of $P_2$ due to delayed closure of aortic valve. Jugular venous pulse may show a dominant 'a' wave if the hypertrophied septum is bulging into RV.

*X-ray*—Heart usually not greatly enlarged, sometimes massive hypertrophy of LV.

*E.C.G.*—LV hypertrophy, wide and double-peaked P waves suggesting LA hypertrophy. There may be large septal Q waves due to hypertrophy and fibrosis of the septum.

*Angiocardiography*—Slit-like left ventricle with often starfish or banana appearance.

*Echocardiography*—shows obstruction in outflow tract, and the muscular hypertrophy.

*Treatment*—(i) Surgical excision or incision of hypertrophied septum, but long-term progress not altered. (ii) Beta-adrenergic blockade with, e g , Propranolol 10 mg. t d.s. may be increased to 200 mg. daily, useful especially for angina

3. **Restrictive cardiomyopathy**—Obliteration of ventricular cavities with impairment of diastolic filling due to fibrosis of endocardium or in myocardium.

*Causes*—(i) Endomyocardial fibrosis (EMF). (ii) End result of Loeffler's eosinophilic endocarditis. (iii) Other toxins that damage endocardium—Anthracycline group (rubidomycin, adriomycin), methysergide. (iv) Amyloidosis.

*Clinical features*—(a) *Right sided disease*—Clinical picture resembles closely constrictive pericarditis with high central venous pressure, unimpressive ventricular pulsation and severe ascites without oedema. (b) *Left ventricular type of disease*—MR tends to occur mainly in early and mid-systole producing a decrescendo systolic murmur. Systemic emboli from thrombus in left ventricle may occur. Atrial fibrillation common

*X-ray*—Enormous cardiac silhouette in right sided disease due to giant right atrium, and partly due to an associated pericardial effusion. In left sided form the LV and LA are both enlarged. A linear strip of calcification may be seen in region of LV.

9. Surgical procedures—After correction of V.S.D., or following insertion of prosthetic valves, or removal of hypertrophied septum in HOCM.
10. Collagen diseases—Rheumatoid arthritis, dermatomyositis.
11. Fistulae—Sinus of Valsalva aneurysm rupturing into right atrium.
12. Trauma.

(c) *Unknown cause*—No obvious myocardial disease.

**Symptoms:**

1. *Due to low cardiac output*—Lassitude, fatigue, lightheadedness, and especially during exercise. Syncope. Symptoms of vertebro-basilar insufficiency and congestive cardiac failure may be precipitated.
2. *Due to increased stroke volume*—Uncomfortable awareness of heart beat, or slow palpitation if block is intermittent.
3. *Due to transient circulatory arrest*—Stokes-Adams syndrome—Symptoms depend on duration of standstill of circulation: About 5 seconds—giddiness and faintness, about 10 seconds—unconsciousness, about 15 seconds—convulsions. Convulsions and incontinence may suggest epilepsy, but in transient asystole pallor is often striking, patient flushes during recovery, and consciousness is regained very rapidly, though some permanent impairment of cerebral function may occur after long or repeated episodes.

**Signs:**

1. *Slow and regular heart rate*—at 30 to 50 beats per minute, which does not usually increase significantly with physical activity or exercise.
2. *Raised JVP*—'a' waves may be seen in the neck unrelated to ventricular beats.
3. *Cannon waves*—Giant 'a' waves which are transmitted to the neck when the atrium contracts against a closed tricuspid valve.
4. *Variation in intensity of 1st heart sound*—1st sound is loudest when the interval between the preceding atrial beat and the ventricular beat is short, it is faintest when the interval is long. From time to time there is a sharp accentuation of the 1st sound at the apex (cannon sound).
5. *Wide pulse pressure*—due to increased systolic pressure and low diastolic pressure. This gives rise to water hammer pulse and capillary pulsation.

**Etiology**—(a) *Age*—Commonest in young adults. (b) *Sex*—60% females. (c) *Heredity*—Sensitive nervous system in family members. (d) *Aggravating factors*—Nervous strain, physical overexertion, exhausting illness or infectious disease, pregnancy.

**Symptoms:**

1. *Chest pain*—Inframammary, pinching or stabbing and fleeting or dull pain of prolonged duration usually located near the cardiac apex, sometimes substernal, bears no relation to effort, usually associated with fatigue. Pain may radiate down the left arm, more commonly down the outer side unlike angina. Area over left breast or apex sore to touch.
2. *Dyspnoea*—common. Sensation as if the breath cannot go through. Sighing respirations characteristic; irregular breathing.
3. *Palpitation*—particularly when lying on left side; often at night and at rest.
4. *Fatigue*—usually after waking in the morning, even after sound sleep. Exhaustion makes patient dread any activity.
5. *Fever*—of mild degree not uncommon. Temperature rarely more than 100.5°F and often detected after mild respiratory infection.
6 *Giddiness*—Usually light headedness or near blackout associated with sudden change of posture.
7. *Miscellaneous*—profuse perspiration, throbbing headache, trembling, irritability, flushing, insomnia, paresthesia, diarrhoea, difficulty in concentration and mental and physical apathy.

**Signs:** None characteristic. Tachycardia, tachypnoea, sighing, tremors, moist cold palms and brisk tendon reflexes are often found as in nervous individuals. During a standard exercise test these patients may have a lower oxygen consumption and greater rise in blood lactate than normal individuals. Slight elevation of blood pressure usually systolic.

**Prognosis:** Good for life expectancy. Degree of incapacity depends on duration and intensity of symptoms. Outlook unfavourable if long history of symptoms, or syndrome precipitated after brief or minor strain and presence of significant psychomotor derangement. Recovery may occur after careful treatment but relapse also likely unless precipitating cause is discovered and abolished.

**Management**—

(i) Psychotherapy—Reassurance and explanation of non-organic nature of complaints. Identification of factors

## D.D. of Bradycardia

| | *Sinus bradycardia* | *Partial heart block (high grade)* | *Complete heart block* | *Sino-atrial block* | *Atrio-ventricular nodal rhythm* |
|---|---|---|---|---|---|
| *Incidence* | Fairly common | Common | Common | Very rare | Very rare |
| *Heart rate* | 40-60 | 40 or less | 40 or less (except congenital, in children or due to digitalis) | About 40 | About 50-60 |
| *Associated condition* | Athlete heart, increased intracranial tension, jaundice, myxoedema | Coronary disease, rheumatic fever or diphtheria, digitalis | Same as partial heart block | Increased vagal tone, digitalis, beta-blocking agents, coronary disease, diphtheria | Digitalis intoxication |
| *Jugular venous pulsations* | Normal 'a' waves preceding carotid impulse | Atrial waves more than ventricular rate | Position of 'a' wave continually changes with periodic cannon waves | No waves during pause in heart sounds | Cannon waves may be seen |
| *Effect of exercise, atropine or emotion* | Increase in rate | Abrupt slowing | No change or slight increase | May disappear | No change |
| *Carotid sinus pressure* | Further slowing especially if sensitive carotid sinus | Further slowing | No effect | Further slowing | May result in atrial standstill with persistent ventricular action |
| *Heart sounds* | Constant | No irregular change. Atrial sounds may be heard | Changing intensity of 1st heart sound. Cannon sounds may be heard. Atrial sounds may be audible | Constant | 1st sound may be intensified due to simultaneous atrial and ventricular contraction |

lowing. Sitting forward may give relief. (ii) Steady severe pain simulating acute myocardial infarction.

2. Dyspnoea and short hacking cough.
3. General symptoms—Fever, sweating, chills, etc. depending on cause.

**Signs :**

1. *Tachycardia.*
2. *Rapid respiratory rate.*
3. *Pericardial friction rub*—Superficial, scratching or grating to-and-fro sound localised to a small area over the precordium, the left sternal edge being the commonest site, or heard all over the left anterior chest. May be transient for few hours or persist for many days. Seldom exactly the same in any two successive cardiac cycles, and changing from day to day.
4. *Atrial arrhythmias*—especially atrial fibrillation not uncommon.

**Diagnosis :** E C.G.—Shows characteristic pattern due to injury to subepicardial portion of myocardium—Elevation of ST segments with an upward concavity in most leads in acute stage, followed after about a week by reutrn of ST segments to isoelectric line with flattening or inversion of T waves. May be normal.

**Treatment**—(a) For bacterial infection—Antibiotics. (b) For viral and autoimmune—Prednisolone 40-60 mg/day or acetyl salicylic acid 4-6 gm/day for 3-6 days, gradually reduced to 7.5 mg or 2 gm/day respectively for 3-4 months.

## II. Pericarditis with effusion

**Types of fluid :**

1. *Transudate*—Congestive heart failure, nephrotic syndrome, myxoedema, beri-beri (wet type).
2. *Exudate*—(a) *Serous*—Usually tuberculous, rarely acute benign pericarditis, or disseminated lupus erythematosus. (b) *Purulent*—Hematogenous spread or direct from empyema, mediastinal abscess, amoebic liver abscess, or infection following aspiration.
3. *Haemorrhagic* (Hemopericardium)—Rupture of the ventricle in transmural myocardial infarction, rupture of aortic dissection or of aneurysm of sinus of Valsalva into the pericardium, tuberculous or malignant effusion, thoracic trauma, tear of right ventricle during pericardial puncture.

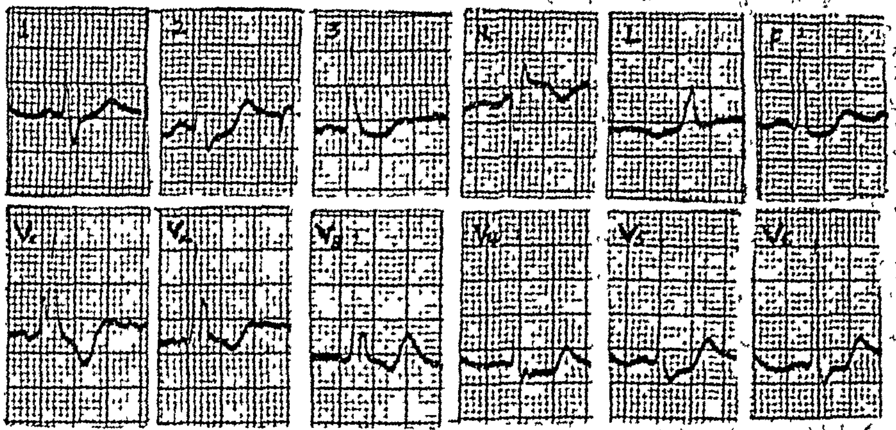


Fig. 2.20 Right bundle branch block. Wide QRS (M shaped) complexe in right ventricular leads and delayed and slurred S waves in left ventricular leads.

LEFT BUNDLE BRANCH BLOCK—

*Causes*—Coronary artery disease, left ventricular hypertroph from any cause, very rarely without evident organic hear disease.

*Diagnosis*—(i) Reversed (paradoxical) splitting of 2nd sounc (ii) E.C.G.—Wide, slurred or notched R wave in left sided ches leads with absent Q waves in these leads. (Fig. 2.21).

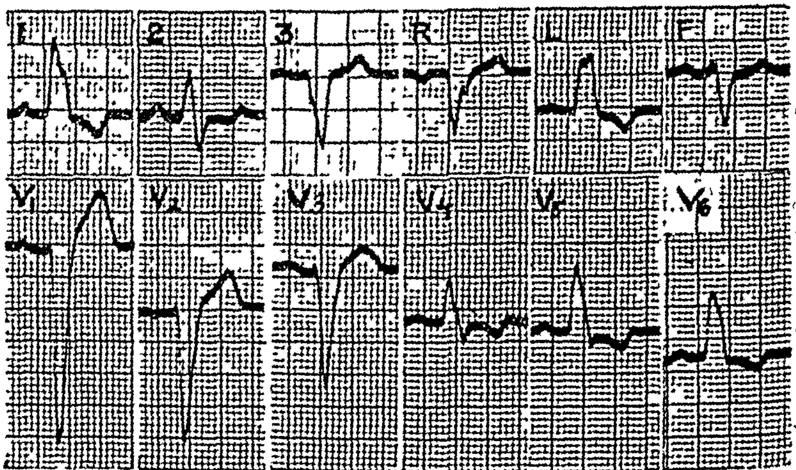


Fig. 2 21 Left bundle branch block. Broad and slurred QRS complexe with negative T in I, $V_5$ $V_6$.

**2. Hemiblocks—**

(i) *Anterior fascicular block* (Left anterior hemiblock)—Isolated block of the anterior division produces extrem

further. When fluid is found it is aspirated into a 20 ml. syringe connected to a three-way tap.

*Complications*—(i) Penetration of either ventricle. (ii) Laceration of coronary artery with formation of hemopericardium. (iii) Shock. (iv) Ventricular tachycardia.

4. CORTICOSTEROIDS—In acute benign pericarditis, disseminated lupus, and pericarditis following myocardial infarction or pericardiotomy. Prednisolone 20 mg. t.d.s.

5. PERICARDIECTOMY—For chronic and recurrent pericardial effusion.

## III. Constrictive pericarditis

**Causes:**

*Common*—1. Tuberculosis in majority.
2. Pyogenic pericarditis.

*Rare*—

1. Acute benign pericarditis.
2. Following hemopericardium.
3. Connective tissue diseases.
4. Deep X-ray therapy to chest.

**Signs:**

A. DUE TO IMPAIRED FILLING OF RIGHT SIDE OF HEART—

1. *Jugular venous pressure*—is high and may rise appreciably during inspiration (Kussmaul's sign). Sharp diastolic collapse ("y" descent) of venous pulse (Friedreich's sign) due to rapid inflow into the ventricles as the tricuspid valve opens.
2. *Cardiac signs*—(a) Palpation—Apex impulse usually impalpable. Typically there is a systolic retraction of the apex beat which is followed by an abrupt outward movement as the ventricle fills rapidly in early diastole (diastolic shock). (b) Auscultation—Loud early 3rd sound (pericardial knock) due to check-rein mechanism and corresponding to the palpable diastolic shock. 2nd sound widely split with little variation with respiration. No heart murmurs or pericardial rub. Auscultation may be completely normal.
3. *Pulse*—Small and rapid. Pulsus paradoxus may be detected. Atrial fibrillation may occur.
4. *Hepatomegaly*—Liver enlarged, tender but not pulsatile.
5. *Ascites*—occurs early with tendency to recur after tapping and with little or no oedema of feet.
6. *Peripheral cyanosis*—of slight or moderate degree common.
7. *Pleural effusion*—common usually bilateral.



Ebstein's anomaly. Note the long smooth convexity of the right heart border due to RA enlargement and convex left border with flattened apex due to RV enlargement



Complete transposition of great vessels Oval cardiac silhouette ('egg on a string' appearance).

(a) *Passive*—due to increase in resistance to left ventricular filling—Mitral stenosis, LV failure.
(b) *Active or vasoconstrictive*—due to alveolar hypoxia, e.g., chronic bronchitis, persons exposed to high altitudes.
(c) *Obstructive or obliterative*—due to decrease in total cross-sectional area of pulmonary vascular bed—e.g., emphysema, extreme fibrosis of lung, miliary emboli or thrombi involving small pulmonary arterial vessels, medial hypertrophy of pulmonary arteries.
(d) *Hyperkinetic*—due to significant increase in pulmonary arterial blood flow—Left to right shunts through PDA. or ASD, or VSD, total anomalous pulmonary venous drainage, persistent truncus, transposition of great vessels.

Common causes of pulmonary hypertension are LV failure, mitral valve disease and lung disease.

## PRIMARY PULMONARY HYPERTENSION

**Symptoms:**

1. *Due to lowered cardiac output*—Easy fatigability, dizziness, syncope.
2. *Due to diminished coronary perfusion*—Angina.

**Signs:**

*Inspection*—Cyanosis usually peripheral, central cyanosis if foramen ovale becomes patent. Giant 'a' waves in jugular venous pulse.

*Palpation*—Left parasternal heave due to RV hypertrophy Small arterial pulse and cold extremities. Diastolic shock in pulmonary area. Presystolic hepatic pulsation may be felt.

*Auscultation*—1. 2nd heart sound closely split, $P_2$ accentuated. 2. Systolic ejection murmur due to blood flow through dilated pulmonary artery. 3. Early systolic ejection sound may be heard in 2nd left space. 4. Early diastolic murmur of relative pulmonary insufficiency. 5. 3rd sound or ventricular gallop may be heard along left sternal edge. 6. Presystolic gallop from increased force of atrial contraction. 7. Pansystolic murmur of relative TR not uncommon.

**Investigations:**

1. *E.C.G.*—Right ventricular and often right atrial hypertrophy (P pulmonale).
2. *X-ray*—In primary pulmonary hypertension prominent main pulmonary arteries, but peripheral lung fields show slight decrease in vascular markings.

musical or twanging quality, it is best heard with child lying down, is less loud in erect posture and disappears when he extends his neck and arches his back.

(b) *Pulmonary systolic murmur*—Soft systolic murmur best heard in second left intercostal space close to the sternum. It becomes louder with tachycardia and hyperkinetic states, and may disappear on inspiration.

(c) *Cardio-respiratory murmur*—May be produced by compression of lung segment by the left ventricle. Heard best at apex. Changes in posture and respiration produce changes in intensity and character of murmur.

**II. Physiological systolic murmurs**—Associated with hyperkinetic or high output states such as exercise, fever, pregnancy. Ejection systolic murmur best heard in the pulmonary area and along the left sternal border. Ejection sound may be heard Loud first sound. Wide pulse pressure. Venous hum and $S_3$ often heard.

**III. Functional (Relative) systolic murmurs**—

(a) **Ejection systolic:**

1. *Aortic or pulmonary ejection flow murmur*—Causes—(i) Increased volumes due to shunt flows, e.g. ASD, VSD, PDA. (ii) Increased stroke volumes due to regurgitant leaks such as aortic and pulmonary regurgitation. (iii) Increased cardiac outputs (innocent murmur) as in thyrotoxicosis, anaemia, exercise, pregnancy, and systemic arteriovenous fistulae (iv) Increased stroke volumes due to marked bradycardia as in complete AV block. (v) A narrow antero-posterior chest diameter (straight back syndrome). The loss of thoracic kyphosis in this condition produces a pulmonary ejection murmur.
2. *Aortic ejection murmur in the elderly*—About 50% over age of 50 have audible aortic ejection murmur without valve stenosis. May be due to fibrous aortic valves which do not fully open, or calcific spurs which protrude into the aortic stream when calcium is laid down at the roots of the cusps, or turbulence in the ascending aorta due to atherosclerotic plaques.
3. *Ejection murmur due to flow into a relatively dilated chamber*—(i) Idiopathic or secondary dilatation of pulmonary artery. (ii) Dilatation of ascending aorta as in aneurysm or pulmonary atresia.

3. *Oedema of legs*—during last 2 months due to increased venous pressure in legs, fluid retention, and reduced oncotic pressure of blood.
4. *Syncope*—in supine position because systolic pressure falls significantly due to pooling of blood in the legs.

SIGNS:

1. *Apex beat*—displaced due to elevated diaphragm.
2. *Arterial pulse*—may be collapsing due to high stroke volume and low peripheral resistance.
3. *Heart sounds*—Loud mitral 1st sound and $P_2$ due to forceful closure from increased stroke volume. 3rd heart sound often audible and may simulate gallop rhythm.
4. *Heart murmurs*—(a) Ejection systolic murmur at apex or base due to high stroke volume. (b) Late parasternal systolic murmur extending into diastole (mammary souffle) in late pregnancy and puerperium. (c) Flow murmur—e.g., mitral stenosis or aortic stenosis due to increased stroke volume. (d) Regurgitation murmur of MR and AR due to decreased peripheral resistance favouring forward flow.
5. *Raised JVP*—owing to high output state.
6. *Arrhythmias*—Ectopic beats, paroxysmal supraventricular tachycardia.

*E.C.G.*—Often prominent S wave in lead I, and Q waves with inverted T waves in III due to rotation of heart.

*X-ray*—Increased pulmonary shadows suggesting hilar congestion. Pulmonary arterial arc prominent due to increased blood flow.

**Management of cardiac disease during pregnancy:**

A. MEDICAL MANAGEMENT—

1. *Restriction of activity*—More hours of rest and sleep.
2. *Infections*—Respiratory tract infections and pyelonephritis should be treated promptly.
3. *Arrhythmias*—Electrical cardioversion for atrial fibrillation. Quinidine should be avoided.
4. *Anaemia*—is not well tolerated and must be avoided.
5. *Hypertension*—may be essential or due to toxemia of pregnancy and should be appropriately managed.
6. *Acute pulmonary oedema*—may be precipitated by anxiety and may even occur in a young patient with moderate MS and few symptoms prior to pregnancy. It is the commonest cause of cardiac death and should be treated promptly.

more severe the stenosis, less the pulmonary flow and shorter the murmur.

4. *Atrial septal defect*—Systolic murmur heard over second and third left interspace. The murmur is due to increased flow of blood across the pulmonary valve and not to the shunt through the septal defect. Wide and fixed split of 2nd sound. Systolic thrill sometimes.

(b) **Pansystolic:**

1. *Mitral regurgitation*—Loud blowing pansystolic murmur best heard at apex. Radiates to axilla and posteriorly. 1st sound normal or soft. A 3rd sound may be heard in severe cases, and a systolic thrill may be felt.
2. *Tricuspid regurgitation*—Pansystolic, harsh blowing murmur loudest in tricuspid area. Murmur increases in intensity during inspiration. May be accompanied by palpable thrill.
3. *Ventricular septal defect*—Murmur depends on size of defect. With mild to moderate defect pansystolic murmur best heard in third or fourth left interspace. Systolic thrill.
4. *Persistent ductus arteriosus*—(i) In infants and young children, where the systemic blood pressure is relatively low only a systolic murmur is heard in the pulmonary area. (ii) With the gradual development of pulmonary hypertension, the typical continuous murmur may be replaced by a systolic murmur only.

(c) **Late systolic:**

1. *Coarctation of aorta*—The following systolic murmurs may be heard—(i) Aortic ejection murmur: produced by blood flow across normal aortic valves and often found in hypertension. When valve stenosis is present, the murmur is loud and radiates more widely. (ii) Systolic murmur due to collaterals—Murmur of varying intensity and widely distributed over collaterals both anteriorly and posteriorly. (iii) Systolic murmur due to coarctation over the site of stricture
2. *Hypertrophic obstructive cardiomyopathy*—Murmur maximal at lower sternal border or apex. Murmur of mitral insufficiency often superimposed. Ejection systolic click never heard. Diastolic murmur of aortic insufficiency never present. Fast rising pulse Ascending aorta seldom dilated on X-ray.

| | *Cardiac asthma* | *Bronchial asthma* |
|---|---|---|
| 2. *Age* ... | Onset usually after 40 | Any age |
| 3 *Precipitating factor* | May be precipitated by exertion or acute myocardial infarction or hypertension | Trigger factors may be infection, non-specific irritants, external allergens, exercise or emotional factors |
| 4. *Symptoms* | | |
| (a) Cough | Cough and dyspnoea almost simultaneous Watery expectoration which increases in intensity towards end of attack | Starts with dyspnoea Expectoration of small sticky pellets Paroxysm ceases when cough becomes profuse |
| (b) Wheezing | Rare | Usual |
| (c) Sweating | Prominent | Rare unless status asthmaticus |
| 5 *Signs* | | |
| (a) Inspection: | | |
| (i) Accessory ms. of respiration | Not active | Active |
| (ii) Shape of chest | Normal | Emphysematous |
| (iii) Respirations | Rapid and shallow | Rapid with prolonged expiration |
| (b) Palpation: | Heart often enlarged, heaving apex beat | Heart not enlarged; if long standing disease right ventricular enlargement |
| (c) Auscultation: | | |
| (i) Chest | Expiration not unduly prolonged<br>Rales more than rhonchi in early stages at lung bases, gradually ascending up with progress of the attack | Expiration markedly prolonged<br>Rhonchi more than rales<br>Signs diffuse all over the lungs |
| (ii) Heart | $A_2$ may be loud<br>Left ventricular gallop | Normal aortic 2nd sound<br>Right ventricular gallop late feature of severe bronchial asthma |
| (d) Pulse | Full and bounding or pulsus alternans | Feeble and rapid |
| (e) B.P. | Usually elevated | Normal or low |
| (f) Signs of underlying disease | A.R., hypertension, or coronary disease | No evidence of cardiovascular disease |
| (g) Sputum | Sputum copious, frothy and pink if pulmonary oedema | Sputum sticky. Laennec's pearls, Curschmann's spirals and Charcot Leyden crystals |

2. *Pulmonary regurgitation*—Uncommon condition. Character same as AR murmur. Site of maximum intensity in pulmonary area and more limited radiation. May result from bacterial endocarditis or surgery, or idiopathic dilatation of pulmonary artery with dilatation of valve ring.

(b) *Mid or late*: Obstruction at A-V valves—

1. *Mitral stenosis*—Accentuated and snapping apical first sound. Low pitched, rumbling diastolic murmur with presystolic accentuation in the established case. Murmur localised to the apex. Opening snap of the mitral valve.
2. *Tricuspid stenosis*—Middiastolic murmur with presystolic accentuation, loudest at lower sternal edge. Murmur tends to be accentuated during inspiration. No presystolic crescendo. Opening snap.
3. *Carey Coombs murmur*—Soft low pitched middiastolic apical murmur due to active rheumatic valvulitis. Murmur usually disappears after acute attack
4. *Myxoma of left atrium*—Murmur variable from time to time. Delayed mitral valve closure gives rise to split 1st sound, early systolic murmur, late diastolic sound (tumour click) and a short mid-diastolic murmur.

## CONTINUOUS MURMURS

1. **Shunt between blood vessel or cardiac chamber of high pressure to one of low pressure—**

   (i) *Intracardiac*—Sinus of Valsalva to right atrium, right ventricle or rarely pulmonary artery. The continuous murmur is heard maximally at lower left sternal border and has a diastolic accentuation.

   (ii) *Extracardiac*—PDA, pulmonary A-V fistula.

2. **Blood flow across severely narrowed vessel**—Coarctation of aorta, aortic arch arteritis.

3 **Increased velocity of blood flow through normal or dilated vessel—**

   (A) **Physiological—**

   (i) *Venous hum*—(a) Soft blowing murmur that starts in systole and continues through second sound into diastole. (b) Heard in some children at the root of the neck or just below the clavicle on either side but more commonly on the right. (c) It can be abolished

III **Laryngeal conditions**—

Acute laryngeal obstruction due to—(1) Whooping cough. (2) Foreign body in larynx. (3) Retropharyngeal abscess. (4) Laryngismus stridulus. (5) Other causes of acute inspiratory dyspnoea with stridor.

IV. **Renal asthma**—History of kidney disease. Enlargement of heart and high B P. Albumin and casts in urine Blood urea and creatinine increased.

V. **Mediastinal conditions**—

1 *Syphilitic aortitis and aneurysm*—Paroxysmal dyspnoea especially at night common (syphilitic asthma). Paramanubrial dullness. 2nd aortic sound loud. Dilatation of aorta on X-Ray.

2. *Mediastinal tumours*—Mediastinal syndrome of dyspnoea, inspiratory stridor and paroxysmal cough. Hoarseness and dysphagia with often signs of pressure on arteries, veins and nerves Usually patient prefers to lean forward X-Ray—non-pulsating shadow of growth.

3 *Acute mediastinitis*—May be acute onset Symptoms of inflammation—fever, toxemia and leucocytosis Pressure symptoms—dyspnoea and paroxysmal or brassy cough and cyanosis Tenderness over sternum, cervical or dorsal spine Dilated veins X-Ray—accentuation and broadening of superior mediastinal shadows

VI. **Nervous**—

1. *Hysterical overventilation*—Usually young female, in presence of audience. Absence of signs of organic disease.

2. *Laryngeal crisis of tabes*—Noisy breathing, cough and acute dyspnoea Absent knee jerks, pupillary changes, ataxia

VII **Acute beriberi**—Rapid onset of oedema, palpitation and dyspnoea. Dilatation of heart, gallop rhythm. Scanty urine Usually tender calves. and absent deep reflexes. E C G—Low amplitude of QRS complexes, tachycardia and prolongation of Q-T interval.

VIII **Thyroid crisis**—Signs of thyrotoxicosis. Marked tachycardia or atrial fibrillation, waterhammer pulse and visible pulsations of vessels of neck

IX. **Thymic asthma**—Usually in infants Dyspnoea less when child held in arms and held up or forwards and worse when made to lie down. X-Ray: may show enlarged thymus

X **Polyarteritis nodosa**—Transient lung infiltrations and hilar adenopathy with or without eosinophilia. Presenting symptom may be asthma. Other widespread manifestations—abdominal, renal, cardiac and neurological Fever common

## 19. DISEASES OF VESSELS

### I. Diseases of aorta and its branches

1. **Abdominal aneurysm**—due to atheroma.

SYMPTOMS—*Stages*—(i) Symptomless enlargement (ii) Onset of symptoms due to stretching—Pain across lower abdomen and lower back Palpable aneurysm is tender. (iii) Leaking aneurysm—Sudden severe pain in abdomen, flank and back, with collapse, followed by partial recovery for few hours and then further episodes leading to death within a few days. (d)

(c) Over collaterals. (d) Systolic murmur of AS. (2) Diastolic murmur—(a) Of AR. (b) Mid-diastolic murmur at apex. (3) Evidence of compensatory collateral circulation—dilated and tortuous internal mammary, intercostal and scapular arteries. (4) B.P. in lower extremities much less than in upper. (5) Femoral pulsations weak, a delay can be appreciated between the femoral and radial pulses. (6) Hypertension (7) Carotid swell—Obstruction of aorta causes excessive carotid and subclavian pulsation. (8) X-ray—small or absent aortic knob, notching of ribs due to pressure from dilated intercostal arteries, enlargement of heart. (9) Angiocardiogram—may reveal coarcted segment.

**Pulmonary stenosis**—(1) Systolic thrill in pulmonary area (2) Loud systolic murmur. (3) Ejection systolic click in mild cases. (4) Both $A_2$ *and* $P_2$ *may be heard in mild cases,* $P_2$ diminishing as the stenosis becomes more marked, in severe cases, $P_2$ inaudible. (5) Giant venous 'a' waves in neck may be seen (6) E C.G —Right ventricular preponderance, tall P pulmonale in leads II and III and deeply inverted T in leads $V_1$ to $V_4$. (7) Radiological appearances—Enlargement of right atrium and ventricle, post-stenotic dilation of main pulmonary artery and diminution of pulmonary vascular markings (8) Catheterization—Pressure in right ventricle markedly elevated with low pressure in pulmonary artery.

## II. Left-to-right shunt (Acyanotic)

**Atrial septal defect**—(1) Visible and palpable right ventricle (2) Systolic thrill over pulmonary area. (3) Systolic murmur over second and third left intercostal spaces. The murmur is due to increased flow of blood across the pulmonary valve and not to the shunt through the septal defect. A mid-diastolic murmur may be heard at the lower sternal border and is thought to be due to increased flow through the tricuspid valve. (4) Pulmonary diastolic murmur in third and fourth left interspaces in one-third of the cases due to relative pulmonary incompetence (5) Second sound widely split in all phases of respiration. (6) Fluoroscopy—prominent pulmonary artery and hilar dance. RA and RV hypertrophy. (7) E.C.G.—Incomplete right bundle branch block. (8) Intracardiac catheterization—Increased $O_2$ content in right atrium as compared to vena cava. Catheter may go through the cleft from right to left atrium The combination of mitral stenosis and atrial septal defect is known as Lutembacher's syndrome. This condition is rare.

*Etiology*—(a) Age—20-30. (b) Sex—Mostly females. (c) Cause unknown, probably tuberculous.

SYMPTOMS AND SIGNS—

(i) *Cardiovascular*—Diminished or absent pulsations in vessels of neck, head and arms. Syncopal attacks. Tachycardia and ectopic beats. Exertional dyspnoea, cardiomegaly and signs of cardiac failure secondary to underlying ischaemic heart disease. Harsh systolic murmurs over stenosed segments of a vessel and soft flow murmurs over various anastomotic channels.

(ii) *Cerebrovascular*—Focal transient symptoms in the carotid or vertebral artery territory or persistent focal neurologic deficit.

(iii) *Trophic changes*—Loss of teeth and hair, ulceration of nose or lips, perforation of nasal septum or palate, cataracts or facial atrophy.

(iv) *Symptoms of intermittent claudication*—Easy fatigability, coldness, paraesthesia, cramp-like pains if collateral circulation is inadequate.

*Investigations*—(i) Angiography—Narrowing or occlusion of involved vessels. (ii) ESR and leucocyte count elevated.

DIFFERENTIAL DIAGNOSIS :

| | *Middle aortic syndrome* | *Congenital coarctation* |
|---|---|---|
| Sex ... | Females predominate | Males predominate |
| Claudication ... | Marked | Uncommon |
| Bruit ... | Usually abdominal | Usually thoracic |
| Associated tuberculous lesion ... | Often | Rare |
| Rib notching ... | Rare | Usual |
| Aortography ... | Usually elongated narrow segment | Usually short narrow segment |
| Left subclavian involvement ... | Common | Very rare |

*Treatment*—(i) Antituberculous drugs. (ii) Anticoagulants to prevent clotting. (iii) Surgical management depending on site of lesion—thrombo-endarterectomy, excision with graft replacement, or by-pass graft.

4. **Subclavian steal syndrome** (Brachio-basilar insufficiency).

*Mechanism*—The syndrome is due to obstruction to innominate artery or subclavian below the origin of the vertebral artery. The affected arm can only receive blood supply by reverse flow down the vertebral artery into the subclavian above the obstruc-



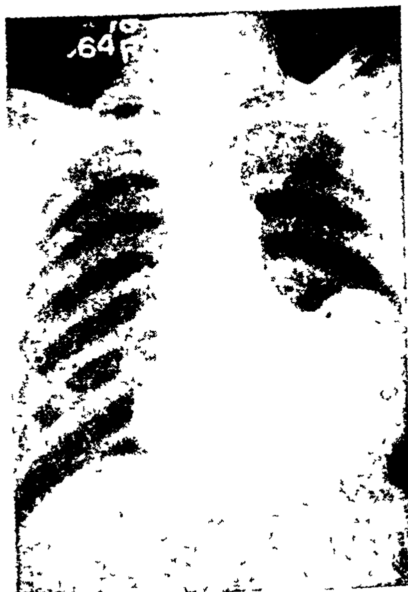
Mitral stenosis An enlarged left atrial appendage protrudes on the left border of the heart, between the pulmonary artery and the left ventricle Note the small horizontal lines (Kerley lines) at the right costophrenic angle



Mitral stenosis Right anterior oblique view of the heart showing barium filled oesophagus displaced posteriorly by an enlarged left atrium



Pulmonary oedema Opacification of central part of each lung, "bat wing" or "butterfly wing" appearance (For causes of pulmonary oedema with no increase in heart size refer Ch 14 . 19).



Large ventricular aneurysm following myocardial infarction

3. DUE TO PHYSICAL AND CHEMICAL AGENTS—
   (a) *Trauma*—Contusion, aneurysm, arteriovenous fistulae.
   (b) *Cold*—Chilblain, frost bite, trench foot and immersion foot.
   (c) *Chemical*—Phenol, ergot, thiopentone, lead
4. DUE TO ARTERIOVENOUS COMMUNICATIONS.

**Symptoms:**

1. *Intermittent claudication*—Severe cramping pains or discomfort on walking which disappears after short rest and recurs when the walk is resumed. The symptom is due to inability of narrow arteries to provide additional blood supply necessary for the exercising muscles. The position of pain of claudication depends on the level of arterial lesion—(a) *Calf claudication*—usually due to obstruction in femoro-popliteal segment. (b) *Thigh claudication*—usually due to iliac occlusion with associated buttock claudication. (c) *Claudication of buttocks, thighs and calves* with impotency in males—Aortic bifurcation lesion. (d) *Foot claudication*—characteristic of thromboangiitis obliterans.
2. *Rest pain*—is less common and suggests more advanced disease. Three types of pain can occur—
   (a) *Pain due to acute arterial occlusion*—Severe pain in tissues distal to the site of obstruction aggravated by limb movement.
   (b) *Pain due to ischaemic neuropathy*—Severe burning or lancinating type of pain occurring usually in paroxysms and worse at night.
   (c) *Pain of pre-gangrene*—Burning, throbbing type of pain which may make the patient sit up in bed and hold his legs. Pain aggravated by heat.
3. *Other symptoms*—Numbness and tingling and feeling of coldness in the involved extremity. The occurrence of sepsis in minor abrasions of the feet may be the first evidence of incipient ischaemia in the limb.

**Examination:**

**Local examination—**

*Inspection—*

1. Colour—Cyanosis or pallor, or rubor if temperature of limb very low. Difference in colour of two limbs of importance.

4. *Arterial* $CO_2$—especially in longstanding airway obstruction as a guide to progress of respiratory failure and indication for assisted ventilation.

**Complications:** (1) *In lung*—Abscess, pulmonary fibrosis with spontaneous pneumothorax rarely. (2) *In pleura*—pleural effusion, empyema. (3) *Cardio-vascular*—myocarditis, pericarditis, endocarditis, peripheral circulatory failure, venous thrombosis. (4) *C.N.S*—Meningitis. (5) *Alimentary*—Acute dilatation of stomach, jaundice, meteorism, diarrhoea, peritonitis. (6) *Joints*—arthritis. (7) *Septicemia.*

CAUSES OF SLOW RESOLUTION—(1) Sterile pleural effusion, empyema or abscess. (2) Tuberculous pneumonia. (3) Partial obstruction of bronchus. (4) Decreased host resistance—Chronic alcoholism, cachexia, agranulocytosis, cardiac failure, immunoglobulin defects. (5) Inappropriate chemotherapy. (6) Superinfection due to organisms like Staph. aureus or E. Coli or B. pyocyaneus.

CAUSES OF RECURRENT PNEUMONIA—(1) Lowered resistance (leucopenia or hypogammaglobulinemia). (2) Diabetes mellitus. (3) Aspiration (sinusitis, use of nose drops with oil base). (4) Bronchial obstruction—Adenoma, carcinoma, foreign body, external compression of bronchi. (5) Bronchiectasis of the bronchus of the infected lobe. (6) Recurrent pulmonary infarcts.

**Differential Diagnosis:**

1 **Type of pneumonia—**

(a) *Pneumococcal*—Commonest form with tendency to attack infants and aged in whom it often takes bronchopneumonic form, resolution good. Septicemia important complication. One of the common infective agents in chronic bronchitis (the other being H. influenzae). Frequently responsible for pneumonia superimposed on chronic airways obstruction. X-ray—Lobar consolidation with natural outline of the lobe preserved.

(b) *Staphylococcal*—Commonly affects infants and young children. Common cause of secondary pneumonia in debilitated patients with chronic lung disease. May be responsible for lethal pneumonia in influenza epidemics. Response to antibiotics especially penicillin unpredictable. Spread of infection is usually bronchial which may lead to subsequent bronchiectasis. Lung abscess and empyema common. X-ray—Lobar consolidation with bulging of the fissure suggesting the lobe is

zosin or hydralazine. Reduction in preload with nitroglycerin is particularly useful if there is pulmonary congestion. It can be maintained with isosorbide dinitrate 30 mg. 6-hourly orally.

(b) CARDIAC ARREST—(i) *Cardiac standstill*—External cardiac massage. If breathing stops mouth-to-mouth respiration or intubation and ventilation with Ambu's bag. If the heart beat does not return after 3 minutes of external cardiac massage, 1 ml. of 1 : 1000 adrenaline solution IV followed by 10 ml. of 10% calcium gluconate. After 5 minutes of cardiac massage, 3-4 gm. of sodium bicarbonate dissolved in 50 ml. of distilled water injected IV to control metabolic acidosis. These injections can be repeated after 10 minutes while massage continues. Transthoracic or transvenous bedside pacing is the treatment of choice. (ii) *Ventricular fibrillation*—External defibrillation by d-c defibrillator.

(c) SHOCK—(i) *Relief of pain.* (ii) *Oxygen*—via nasal catheter at flow rate of 2-4 L per minute. (iii) *Correction of hypovolemia*—by infusion of 100-150 ml. dextrose in water, or low molecular weight dextran until central venous pressure is in the upper normal range. (iv) *Monitoring*—(a) Central venous pressure monitoring via a polythylene catheter in SVC or right atrium is of value. A low central venous pressure usually indicates need for cautious fluid replacement. (b) Urine flow—as index of organ perfusion. 30 ml. per hour is considered the minimal acceptable flow rate. (v) *Treatment of arrhythmia*—if any. (vi) *Correction of acidosis*—Sodium bicarbonate infusion. 50-100 ml. of 7.5% solution IV initially. (vii) *Vasopressors*—(a) Alpha-adrenergic receptor stimulants—*Norepinephrine* 4-8 mg. in 1 L of 5% dextrose in water. Drip rate should be adjusted to have systolic pressure of 90 mm., or *Metaraminol* 2.5-7 5 mg. in 500 ml. 5% dextrose. (b) Beta-receptor stimulants— (i) *Dopamine*—Initial dose 2-5 mcg/kg/min IV increased until B.P. and urine flow respond. High doses may cause ectopic rhythm, nausea and vomiting. (ii) *Isoproterenol*—Valuable in patients with extremely high peripheral vascular resistance and low cardiac output. Dose—1-2 mg. in 500 ml. 5% dextrose in water at a rate sufficient to achieve desired effects. Clinical usefulness limited by degree of tachycardia and its tendency to cause ectopic rhythms. (viii) *Corticosteroids*—may be

| | *Bacterial pneumonia* | *Viral pneumonia* |
|---|---|---|
| X-ray ... | Hazy, relatively uniform shadow corresponding to anatomical situation of affected lobe | Homogenous shadows with ill-defined edges usually not corresponding to anatomical lobes or segments, or ground glass appearance at periphery with finely nodular opacities |
| Response to antibiotics | Striking | Failure of rapid resolution with antibiotics |

2. **Other intrathoracic conditions—**

(a) *Pleural effusion*—Preliminary upper respiratory infection less likely in tuberculous effusion. Cough and sputum less obvious. Sputum not purulent In early stages in pleural effusion there may be bronchial breathing. White cell count normal.

(b) *Pulmonary infarction*—Sudden onset but no rapid rise of temperature or rigor as in pneumonia. Blood-stained sputum and presence of predisposing condition like obvious venous thrombosis or heart disease.

(c) *Bronchiectasis*—Recurrent infection and persistently muco-purulent expectoration. Finger clubbing. Coarse basal crepitations.

(d) *Atelectasis*—Detection of cause such as aspiration of foreign body, or post-operative or following trauma. Displacement of mediastinum.

(e) *Carcinoma of bronchus*—Patient may present with pneumonia affecting the ill-drained lung beyond the growth. Superimposed hilar shadows on x-ray may give clue to underlying pathology.

(f) *Extrinsic allergic alveolitis*—History of exposure to allergen. Abrupt onset with shortness of breath, rigor, fever and dry cough. Fine crepitations throughout both lungs in acute cases. Hypergammaglobulinemia with raised IgA and IgC levels. X-ray may be normal, or more often widespread fine nodules with groundglass appearance in all lung zones. In some cases more confluent fluffy opacities.

oesophageal obstruction, tracheo-oesophageal fistula, drowning. (b) Vomit. (c) Bronchiectasis. (d) Iatrogenic following use of intermittent positive pressure breathing therapy and nebulisers.
2. *Specific abscesses*—(a) Lobar pneumonia particularly Klebsiella, Staphylococcal or haemolytic streptococcal pneumonia. (b) Tuberculosis. (c) Fungal infection, e.g., actinomycosis.
3. *Bronchial obstruction or stenosis*—Benign tumours, or inspissated bronchial mucus, or foreign body, mucoviscidosis.
4. *Metastatic lung abscess*—Suppurative thromboembolism involving lung parenchyma—pulmonary embolism from pelvic thrombophlebitis or right sided endocarditis, or during septicemia and pyemia.
5. *Malignancy*—Necrosis within a large solitary nodular malignant neoplasm.
6. *Infected cysts*—Congenital or acquired.
7. *Extension from neighbouring organs*—Diaphragm e.g. amoebic infection, vertebral column.

**Symptoms**—Groups :
1. *Mild general toxaemia*—with slight fever. No symptoms referrable to respiratory tract.
2. *Sudden onset*—with high fever, pleuritic chest pain, cough and later copious expectoration.
3. *Symptoms of subacute or chronic respiratory disease*—cough, foetid breath, expectoration and general toxaemia. Hemoptysis may occur, or pain due to associated pleurisy.

**Signs** : Depend on situation and size of abscess and surrounding infiltration.
1. *In early stages*—Pleural rub, local area of dullness and weak breath sounds or signs of consolidation.
2. *After evacuation of pus*—signs of cavitation, or signs of localized consolidation with amphoric or cavernous breath sounds and rales of the resonating variety.
3. *Signs of effusion*—may overshadow those of the lung lesion.
4. *Clubbing of fingers.*

**Investigations :**
1. *Leucocyte count*—20,000 to 30,000 cells per c.mm.
2. *Sputum*—Pus cells, organisms and necrotic lung tissue.
3. *X-ray*—In acute phase dark shadow, later cavity with fluid level.
4. *Bronchoscopy*—to exclude foreign body or carcinoma.

A. *Asystole* (usually associated with complete heart block and Stokes-Adams attacks)—(i) Prepare for external pacing. In the meantime (ii) Inject—(a) *Calcium chloride* 10 ml. 10% IV or directly into heart. (b) *Atropine* 0.6 mg. IV. (c) *Isoprenaline* 0.1–0.2 mg. IV (d) *Adrenaline* 10 ml. of 1 : 10000 solution IV or intracardially. (e) *Hydrocortisone* 100-200 mg. IV.

B. *Ventricular fibrillation*—(i) External D.C. defibrillation as soon as equipment is available. In the meantime (ii) Continue external cardiac massage and ventilation, soda bicarb, and IV adrenaline as above. Other useful drugs are Lignocaine 50-100 mg. as bolus followed by 1-2 mg./min. for maintenance or Propranolol 5-10 mg. IV.

III. OPEN THE CHEST—if above measures are unsuccessful—

(a) *Asystole*—(i) Direct cardiac compression. (ii) Internal pacemaker if unsuccessful.

(b) *Ventricular fibrillation*—(i) Direct cardiac compression. (ii) Internal defibrillator if unsuccessful.

## 10. CARDIAC FAILURE

**Classification:**

*According to cardiac output*—

1. *Low output failure* or heart failure due to primary heart disease—Rheumatic and syphilitic valvular disease, hypertension, myocardial infarction, congenital heart disease, myocarditis.
2. *High output failure* or heart failure due primarily to non-cardiac disturbances—Hyperthyroidism, severe anaemia. beriberi, peripheral arteriovenous fistula, Paget's disease, some cases of cor pulmonale.

*According to phase of cardiac cycle*—

(a) *Hyposystolic*
- Left ventricular failure
- Right ventricular failure
- Combined (biventricular) failure

(b) *Hypodiastolic*
- Limitation of diastole, e.g., paroxysmal tachycardia
- Abbreviation of diastole, e.g., constrictive pericarditis

infection and (c) high sweat sodium. Picture similar to bronchiectasis but usually increased number of infectious flareups, more airway obstruction, earlier and more pulmonary insufficiency and poorer nutrition due, in part, to exocrine pancreatic insufficiency. Chest radiograph shows streaky or patchy shadows with or without cavitation.

14. *Wegner's granulomatosis*—Respiratory symptoms such as cough, haemoptysis, dyspnoea. Lesions bilateral and in lower lung fields. Cavitation with thin walls may be seen with sharply outlined borders.

**Management:**

1. General—(a) Rest in bed. Ambulation as soon as signs of toxicity disappear. (b) High caloric, high protein diet with additional vitamins. (c) Transfusions as indicated. (d) Deep breathing exercises to encourage drainage.

2. Mechanical procedures—(a) *Postural drainage*—Percussion therapy or "clapping" over the site of the abscess with the patient in the postural drainage position is often effective in dislodging and expelling secretions from the cavity. (b) *Bronchoscopy*—Suction is applied to the orifices of the bronchi leading to segments presumed to be involved in the process in hope of initiating or promoting drainage. In addition any foreign material is removed and a careful search made for a tumour. (c) *Oxygen inhalations*—when sputum is foul because it checks the anaerobic organisms.

3. Chemotherapy—The most effective antibiotic is determined by culturing the sputum and testing the causative organism against the available drugs. Penicillin is the most useful antibiotic in the common forms of lung abscess. Benzyl penicillin 1-2 mega units IM 8-hourly for 4 to 6 weeks, then if necessary phenoxymethyl penicillin 250 mg. q.d.s. by mouth. Also streptomycin 1 gm. daily because of mixed bacterial flora. For penicillin resistant organisms Cloxacillin 250 mg. IM 6-hourly. Other antibiotics can be substituted for penicillin when the bacterial flora and its drug susceptibility become known Emetine or metronidazole if amoebic pleuro-pulmonary infection.

4. Surgical resection—If at end of 3 weeks, there is no clinical and radiological improvement, segmental resection of lung, lobectomy or pneumonectomy.

## 9. PULMONARY TUBERCULOSIS

**Etiology:**

*Predisposing causes*—(a) *Environmental factors* that lower resistance—Malnutrition, poor and overcrowded housing, alco-

the attack gradually subsides, occasionally it ends fatally.

(b) *Cough*—due to bronchial congestion. Upper respiratory infection common. Occasionally paroxysmal cough on effort.

(c) *Hemoptysis*—usually due to pulmonary congestion or infection.

(d) *Profuse sweating*—early and characteristic feature.

2. DUE TO REDUCTION IN FORWARD FLOW—Fatigue, weakness, insomnia. Nocturnal frequency of urine may occur with oliguria during day time.

**Signs:**

1. *Left ventricular hypertrophy.*
2. *Gallop-rhythm*—A triple rhythm, (so called because of its resemblance to the cadence of the sounds produced by a galloping horse). A ventricular diastolic gallop rhythm is loudest at the cardiac apex and may be brought out by having the patient lie in the left lateral decubitus. It is often associated with a palpable diastolic impulse at the cardiac apex There may be a presystolic gallop due to left atrial fourth heart sound (especially with myocardial or coronary disease, or aortic stenosis). Summation gallop (combination of protodiastolic and presystolic gallop) at a rapid rate usually signifies failure of the left ventricle.
3. *Pulsus alternans*—Alternate large and small pulses, without any change in rhythm.
4. *Basal rales*—with often expiratory wheezing. In acute pulmonary oedema medium to loud bubbling rales are heard all over the lungs. Pleural effusion may occur particularly on left side.
5. *Cheyne Stokes respiration*—A periodic form of breathing characterised by waxing and waning of the depth of respirations and regularly recurring periods of apnoea may occur.
6. *Signs of causative disease*—e g. hypertension.

**Investigations:**

1. *X-ray chest*—Hilar congestion is an early sign. Opacities tend to spread in a butterfly manner from the hila (bat's wings appearance) in acute pulmonary oedema. With more extensive oedema diffuse mottling of lungs or cloudy lung fields. Left ventricular enlargement.
2. *E.C.G.*—LV hypertrophy, or myocardial ischaemia or infarction.

The large middle lobe bronchus is particularly vulnerable and the bronchiectasis may lead to recurrent middle lobe infection (middle lobe syndrome).

| *Primary complex* | *Reinfection* |
|---|---|
| 1. Enlargement of hilar lymph nodes. | 1. Absence of enlarged hilar lymph nodes. |
| 2. Any part of lung. | 2. Usually subapical location. |
| 3. Usually heals, cavitation rare. | 3. Tendency to cavitation and progress. |
| 4. Miliary spread common. | 4. Miliary spread rare. |

MANAGEMENT—Mild case—PAS 300 mg./kg./day and INH 3 mg./kg./day in two divided doses. Severe lesion—Strepto 30 mg./kg./day IM plus PAS and INH. When main clinical manifestations have subsided only PAS and INH continued. If lesion is not resolving, bronchoscopy should be done and the bronchus sucked out as collapse may be associated with retained secretion.

II **Post-primary tuberculosis**—may occur—(a) as a progressive primary lesion, (b) as result of reactivation of primary lesion, (c) due to subsequent exogenous infection.

A. **Acute pulmonary tuberculosis:**

1. PNEUMONIC TUBERCULOSIS—affects usually upper lobe, rarely whole lung. Symptoms like acute lobar pneumonia, but irregular temperature, rapid breathing, sweats, signs of cavitation. Leucopenia and failure to respond to antibiotics.
2. BRONCHOPNEUMONIC TUBERCULOSIS—Abrupt onset at times following influenza, or in children measles or whooping cough, or as a sequel of haemoptysis with aspiration of tuberculous matter into bronchi. Signs of diffuse bronchitis in early stage, later areas of consolidation especially at apex. Rapid wasting. X-ray shows scattered foci throughout lungs. May be rapidly fatal.
3. MILIARY TUBERCULOSIS—*Clinical features*—
   (a) *Onset*—Gradual with vague ill-health, loss of weight and fever.
   (b) *Fever*—irregular, wide variation between morning and evening, occasionally step ladder rise.
   (c) *Gastro-intestinal symptoms*—Vomiting, anorexia, constipation, sores round lips. Spleen usually enlarged, liver may be enlarged.

(i) *Cerebral*—Headache, insomnia, restlessness, sluggish mental state.
(ii) *Pulmonary*—Cough, dyspnoea, rarely orthopnoea, hemoptysis.
(iii) *Portal*—Anorexia, nausea and vomiting, fullness after meals. Pain in right hypochondrium commonly aggravated on exertion (hepatic angina). In patients with long-standing congestion caused by for example cardiomyopathy, there may be steatorrhoea and protein loss.
(iv) *Renal*—Nocturia and oliguria.
(v) *Peripheral*—Oedema of feet or generalised anasarca.

**Signs:**

1. *Raised JVP*—Positive hepato-jugular reflux.
2. *Enlarged and tender liver*—Systolic pulsation of liver if tricuspid incompetence.
3. *Oedema*—The erect position favours collection of fluid in feet, ankles and lower portion of legs, whereas recumbent position favours accumulation in sacral region. If oedema is severe it may be associated with hydrothorax (more often on right side). and hydropericardium and occasionally ascites.
4. *Evidence of heart disease*—Signs associated with underlying disease. Cardiomegaly with evidence of right ventricular or combined ventricular enlargement. Right ventricular gallop. Murmur of functional tricuspid incompetence common.
5. *Peripheral cyanosis*—May occur due to slow peripheral circulation.
6 *Cardiac cachexia*—Loss of subcutaneous fat and muscle tissue.

**Management:** of congestive cardiac failure—

I. **Rest**—Physical and mental. Rest in bed and in chair till there is no longer venous engorgment, oedema or congestion of lungs and heart rate constantly under 80 per minute for some days.

II. **Diet**—Restricted salt intake (2 gm. salt per day). Salt substitutes may be used for palatability. Fluid intake upto 2500–3000 ml. daily may be allowed. Frequent, small, bland, low caloric feeds preferred at onset of therapy.

III. **Digitalis** — *Mode of action* — (i) Enhancement of force of systolic contraction and increase of mechanical efficiency of the failing heart. (ii) Blocking of conduction through A.V. node.

14. Senile—Slow onset, symptoms of bronchitis or emphysema.
15. Asthmatic—Usually young patient starts getting attacks of so called "bronchial asthma" for the first time
16. Amenorrhoea or oligomenorrhoea—may be the presenting symptom in young women.
17. Lymph node enlargement—including hilar, mediastinal and cervical groups or generalised with splenomegaly.
18 Mental symptoms—such as irritability and difficulty in concentration suggesting neurosis.
19. Patients who have had previous gastrectomy for peptic ulcer.

**Symptoms:**

1. *Local (pulmonary) symptoms*—(a) Cough—early symptom. Mostly at night and in early morning. In early stages often dry and hacking, later loose with sputum. With cavitation often paroxysmal especially in morning. Localised wheezing may be complained of due to bronchial narrowing by tuberculous lymphnodes. (b) Sputum—may be absent in early stages Not characteristics until late stage when nummular. (c) Haemoptysis—In early stage blood-stained sputum, later from cavity may be profuse. (d) Dyspnoea—usually manifestation of extensive disease, pneumothorax, or rapid development of large pleural effusion.

2. *General (constitutional) symptoms*—(a) Fever—varies with extent and activity of disease and amount of exercise. (b) Sweating—especially during night. (c) Loss of weight. (d) Anorexia. (e) Lassitude. (f) Palpitation due to tachycardia.

3. *Extrapulmonary symptoms*—may result from secondary tuberculous involvement of various parts of body—meninges, larynx, pericardium, peritoneum, bones and joints, genitourinary system.

**Physical signs:** Depend on stage and extent of disease. In initial stages signs are usually none, diagnosis being radiological.

1. *Early signs*—are post-tussive crepitations heard most commonly at the lung apices, and localised wheeze may be audible in relation to narrowed bronchi.

2. *Signs of consolidation*—Limitation of movement over affected part of chest, diminished pulmonary resonance, bronchial breath sounds.

3. *Signs of cavitation*—Impaired note, or tympanitic note if cavity large. Breath sounds bronchial, cavernous or amphoric depending on size of cavity. Crackling rales.

4. *Signs of fibrosis*—Affected side of chest flattened with displacement of apex impulse to side of lesion. Vocal resonance

| Preparation | Oral Dosage | | | | Maintenance dose |
|---|---|---|---|---|---|
| | Severe case | | Moderate case | | |
| | Initial | Until digitalization | Initial | Until digitalization | |
| Digoxin ... | 1.5 mg | 0.5 mg. 6 hourly | 0.5 mg. | 0.5 mg t.d.s. | 0.25–0.15 mg |
| Digitoxin ... | 0.6 mg | 0.2 mg „ | 0.2 mg. | 0.2 mg. „ | 0.1–0.2 mg |
| Lanatoside C ... | 3 mg. | 1 mg „ | 1 mg. | 1 mg. „ | 0.5–1 mg. |

TOXIC EFFECTS—(a) *Extracardiac*—(i) Gastrointestinal—Anorexia, nausea, vomiting, occasionally diarrhoea. (ii) Visual—blurring, scotomata, yellow or green vision. (iii) Neurological—headache, neuralgia of face and upper extremities. (iv) General weakness and lassitude. (v) Cutaneous—Skin rashes (vi) Gynecomastia. (vii) Idiosyncrasy rare—thrombocytopenic purpura. (b) *Cardiac*—Arrhythmias—(i) Premature ventricular beats especially when coupled, in salvos or of multifocal origin. (ii) A-V block (not Mobitz type I). (iii) A-V junctional rhythm with A-V dissociation. (iv) A-V junctional tachycardia. (v) Bradycardia or S-A block. (vi) Paroxysmal atrial tachycardia with AV block. (vii) Paroxysmal ventricular tachycardia or ventricular fibrillation.

*Treatment of toxicity*—Stop the drug and correct any hypokalemia. For dangerous ventricular arrhythmias Lignocaine as in coronary care, or Phenytoin 100 mg. IV every 10 minutes upto loading dose of 1 gm. Electroversion (DC shock) should be avoided.

## IV. **Diuretics**—

**Groups of Diuretics:**

1. LOOP DIURETICS—(High efficacy diuretics)—Major action on ascending loop of Henle. (a) *Frusemide*—(Lasix) Average single dose 40 mg. oral or IV. (b) *Ethacrynic acid* (Edecrin)—50 mg. oral once or twice daily or IV. (c) *Bumetanide* (Burinex)—1 mg. o.d. or b.d. or 0.5 mg. IV.

2. BENZOTHIAZINE COMPOUNDS (Medium efficacy diuretics). Site of action—cortical diluting segment of loop of Henle and at beginning of distal convoluted tubule where they interfere with active reabsorption of sodium ions. (a) *Thiazides*—Daily dose: Chlorothiazide (Saluric) 1 gm., Hydrochlorothiazide (Esidrex) 50 mg., Hydroflumethiazide (Naclex) 100 mg., Cyclopenthiazide (Navidrex) 0.5 mg., Bendrofluazide (Neo-Naclex,

**Drugs for Primary Chemotherapy:**

| *Drug* | *Daily dose* | *Toxicity* |
|---|---|---|
| *Streptomycin* .. | <40 1 gm. >40 0.75 gm. 1 gm. twice weekly (with large dose of isoniazid) | Vestibular damage (nystagmus, vertigo), skin rash Rarely irreversible deafness |
| *PAS* ... | 6 gm b.d | G I disturbances, goitres, hypothyroidism, hypokalemia, liver damage, glandular fever-like syndrome |
| *Isoniazid* . | 300 mg once, or 150 mg. b d, or 15 mg / kg twice weekly with Strepto | In high doses peripheral neuropathy Rarely psychosis, intellectual impairment, insomnia, epilepsy |
| *Thiacetazone* ... | 75 mg. b d. or 150 mg single dose | Nausea, vomiting, vertigo, toxic erythema. Serious side effects include anaemia, agranulocytosis and hepatic dysfunction |
| *Ethambutol* ... | 15 mg./kg./day single dose | Reversible form of optic neuritis (blurring of vision) |
| *Rifampicin* .. | <55 kg 450 mg./day >55 kg. 600 mg./day single dose | Red colour of urine and sputum Hepatitis |

**Classical chemotherapy:**

| INITIAL TRIPLE THERAPY | MAINTENANCE THERAPY |
|---|---|
| 1. 100% *effective:* | |
| Strep., PAS, INH | Daily PAS, INH |
| | Twice weekly Strep., INH |
| Strep., Thiacetazone, INH | Daily Thiacetazone, INH |
| | Twice weekly Strep, INH |
| 2. *Highly effective:* | |
| Strep., Ethambutol, INH | Daily Ethambutol, INH |
| Strep., Rifampicin, INH | Daily Rifampicin, INH |
| Strep., PAS, INH | Twice weekly PAS, INH |

*Duration of therapy*—(a) *Initial*—From 6 weeks to 6 months depending on initial extent of disease. (b) *Maintenance*—One year for non-cavitated disease, 18 months to 2 years for cavitated disease.

days a week or less, limit fluid intake to one litre daily Administration of salt should be avoided since it creates intense thirst, which when satisfied leads to redilution of body fluids. Osmotic diuresis with Mannitol in cirrhosis.

4. *Hyperuricemia*—may cause secondary gout. This is due to the fact that proximal tubular reabsorption is increased in a non-specific way as a result of sodium depletion.

5. *Hyperglycemia and impaired glucose tolerance*—Risk of precipitating diabetes mellitus rare, but aggravation of established diabetes likely.

6. *Fall of blood pressure*—Thiazides potentiate the action of guanethidine and if a hypertensive patient on such treatment is given a diuretic for CCF a marked fall in B.P. may occur.

7. *Urinary retention*—particularly in presence of prostatic enlargement.

8. *Miscellaneous*—Less common complications include hypothyroidism, vasculitis, cholestatic jaundice, skin rashes, hypersensitivity reactions, diarrhoea, acute haemorrhagic pancreatitis and bone marrow damage.

V. **Other drug therapy**—

1. *Sedatives*—For adequate sleep. Barbiturates, chloral hydrate, or chlordiazepoxide or meprobamate. In bad cases pethidine may be necessary.

2. *Laxatives*—Milk of magnesia, senna, or glycerin suppository.

3. *Treatment of arrhythmia.*

4 *Therapy of anaemia.*

5. *Aminophylline*—0.25 to 0.5 gm. in 10 ml. distilled water IV may help in reducing bronchospasm, stimulating ventricular contraction and the respiratory centre and acting as a mild diuretic.

6. *Vasodilators*—Hydralazine or Prazosin.

7. *Anticoagulants*—To reduce frequency of thrombo-embolic complications in patients needing prolonged rest, patients with cardiomyopathy, recent or old cardiac infarction, chronic atrial fibrillation, chronic obstructive lung disease, or a history of thromboembolic episodes.

8. *Antibiotics*—Adequate control of pulmonary infection at the earliest possible moment.

9. *Antiemetics*—Triflupromazine 10 to 20 mg. or Promazine 25 to 50 mg by mouth or intramuscularly if vomiting.

(b) Haemoptysis. (See page 258).

(c) Laryngitis—Rest to the voice. If pain, anaesthetic powders, sprays or lozenges. Injection of alcohol into superior laryngeal nerve will give temporary relief.

**Chemoprophylaxis**—Isoniazid 5 mg/kg daily in all forms of chemoprophylaxis. Chemoprophylaxis may be used in three ways:

1. PRIMARY (infection) CHEMOPROPHYLAXIS—Uninfected tuberculin negative individuals are treated to prevent infection. It may be used in suckling infants where separation from an infectious mother would be unjustified. Isoniazid-resistant BCG may be given simultaneously with isoniazid chemoprophylaxis.

2. SECONDARY (disease) CHEMOPROPHYLAXIS—Infected tuberculin positive individuals are treated to prevent disease. Indications are—(i) Positive tuberculin reactors less than 5 years of age. (ii) Known recent tuberculin converters. (iii) Positive tuberculin reactors among child contacts of infectious persons. (iv) Patients with calcified pulmonary lesions or shadows which might be caused by old tuberculous lesions, who require long-term corticosteroid therapy for other diseases such as bronchial asthma.

3. COMMUNITY CHEMOPROPHYLAXIS—Drugs are given to whole population including groups 1 and 2 and also individuals with doubtfully active radiographically evident lesions, a technique effective in areas of high prevalence.

## 10. EOSINOPHILIC LUNG (Tropical eosinophilia)

**Definition**—A syndrome characterised chiefly by cough, paroxysms of dyspnoea, a raised white cell count with persistent and absolute eosinophilia, and often systemic manifestations such as fever, loss of weight and lassitude.

*Causation*—Due to infection with some form of filaria. Microfilariae have been demonstrated in the lung, liver and lymph-nodes. The lesions in all the tissues involved appear more likely to be due to direct invasion by microfilariae than to be the result of visceral allergy. During the active phase of the disease, the microfilariae probably continue to be liberated from the adult worms only to become trapped in the tissues, dying there and exciting the characteristic eosinophilic reaction.

**Symptoms:**

*Onset*—Slow and insidious with symptoms of asthmatic bronchitis. Rarely sudden onset with fever, headache and bodyache.

1. *Cough*—Most prominent symptom. In early stages dry, hacking. Later on paroxysmal and worse at night, especially

**Causes :**

1. **Hypovolemic**—Failure of venous return to the heart due to decreased circulatory blood volume. (i) Pure haemorrhage—Gastro-intestinal bleeding, penetrating wounds (liver, spleen, kidney, artery), ruptured aneurysm. (ii) Plasma (and extra-cellular fluid) deficits—major burns, peritonitis, pancreatitis, intestinal obstruction, mesenteric venous thrombosis. (iii) Water and electrolytes—Profuse diarrhoea or vomiting.

2. **Cardiogenic** (Pump failure) (a) *Acute deficiency in cardiac filling*—(i) Mechanical hindrance—Cardiac tamponade. (ii) Paroxysmal tachycardia. (b) *Acute deficiency in cardiac emptying*—(i) Acute myocardial infarction. (ii) Acute myocarditis. (iii) Stokes-Adams syndrome. (iv) Rupture of valve cusps, papillary muscle, interventricular septum or chordae tendinae.

3. **Septic** (Endotoxin or gram negative shock)—Severe toxemia paralysing vasomotor system and causing pooling of blood in small vessels. Most common organisms are gram-negative bacteria such as E. coli, str. faecalis and pseudomonas aeruginosa. Rarely gram-positive organisms like strepto, staphylo or pneumococcus. Septic shock may follow instrumentation of urinary or gastro-intestinal tract, septic abortion, chronic disease such as cancer, diabetes mellitus, cirrhosis, or immunosuppressive or steroid therapy.

4. **Anaphylactic**—Due to antigen-antibody reaction e g. following penicillin, streptomycin, liver extract, vitamin $B_1$, etc Laryngeal oedema and bronchospasm are the leading causes of death resulting in respiratory insufficiency.

5. **Vascular**—Due to impeded blood flow e g. massive pulmonary embolism, dissecting aortic aneurysm, cardiac tamponade, ball valve thrombus of left atrium, tension pneumothorax.

6. **Endocrine**—(i) Severe hypopituitarism. (ii) Myxoedema. (iii) Acute adrenocortical insufficiency. (iv) Pheochromocytoma.

7. **Neurogenic**—Due to interruption of neural mechanisms that maintain vascular tone, cardiac output and venous return —General or spinal anaesthesia, psychic stimuli, wounds of pleura, testicular trauma.

8. **Drug induced**—Ganglion blocking drugs, nitrates, poisoning with hypnotics.

**Clinical Features :**

1. *Signs of sudden fall in cardiac output*—Pallor, sweating, hypotension, tachycardia, grayish cyanosis, subnormal temperature.

2. *Asthmatic pulmonary eosinophilia*—Patient ill with high fever, breathlessness and raised sedimentation rate. Transient pulmonary infiltrations. Quick response to corticosteroids.
3. *Chronic pulmonary eosinophilia*—Preponderance in females. Symptoms more severe than in simple pulmonary eosinophilia and more protracted Diagnosis based on lung biopsy which shows alveolar and interstitial consolidation. Wheeze present. X-ray—bilateral shadows, more peripheral with relative sparing of perihilar areas.
4. *Bronchopulmonary aspergillosis*—Occurs predominantly in atopic extrinsic asthmatics. Minimal symptoms, or coughing up of characteristic plugs, or increase in asthma, or general symptoms of malaise and fever. Chest radiograph shows shadows in one or both lungs, rapidly changing over a few days. Presence of mycelial elements of Aspergillus fumigatus. Bronchographic appearance of proximal dilatation with normal peripheral filling almost pathognomonic. High levels of specific antibodies in serum. Skin reaction to extract of A. fumigatus.
5. *Parasitic diseases*—e.g. ascaris, strongyloides, ancylostoma, toxocara pass through or involve the lungs of the host during their life cycle. Transient illness characterised by cough, dyspnoea, fever, eosinophilia and radiological appearance of multiple poorly circumscribed areas of pulmonary consolidation.
6. *Drug reactions*—Allergic reaction to—PAS, sulphonamides, penicillin, iodides, nitrofurantoin, mephenesin, horse serum, imipramine, chlorpropamide, nickle. Clinical manifestations in majority identical to Loeffler's syndrome.
7. *Fungal infection*—Primary coccidioidomycosis is accompanied by eosinophilia especially if erythema nodosum is present. Coccidioidin skin test usually positive. Specific precipitating or agglutinating antibodies
8. *Allergic granulomatosis*—Most commonly in women with long preceding history of allergic disease, usually asthma. Pulmonary manifestations include asthma, migratory pneumonitis and sometimes reticular lesions within the lungs. Extra-pulmonary manifestations may develop later and include purpuric eruptions, pericarditis, cardiac failure, convulsions, retinopathy, diarrhoea and haematuria Striking response to steroids.
9 *Hypereosinophilic syndromes*—Group of conditions characterised by leucocytosis with eosinophilia in peripheral blood

they should, if possible, be warmed. Transfusion should be slowed down when arterial pressure and central venous pressure have risen to satisfactory levels. (CVP about 5 cm. above sternal angle).

6. *Correction of acidosis*—if severe or persistent by IV administration of sodium bicarbonate 100-150 ml. of 7.5% solution, or trihydroxyaminomethane (THAM) 0.3 M solution at rate of 300 ml./hour by IV infusion, because acidosis causes depression of myocardial contractility as well as resistance to action of catecholamines.
7. *Antibiotics*—The most suitable antibiotics for gram negative septicemia are—Gentamycin 80 mg. IM 8-hourly, Colistin 400 mg. daily, Kanamycin 250 mg 6-hourly, Carbenicillin 1 g. 4-hourly or Chloramphenicol or Tetracycline 2 g. daily.
8. *Vasopressors*—The beneficial effects of these drugs in shock result from their positive inotropic effect (increase in contractility of myocardium), and the peripheral vasoconstricting action of drugs, such as noradrenaline and metaraminol is potentially harmful.

| *Drug* | *Route and IV Dose* | *Comments* |
|---|---|---|
| *Alpha-receptor stimulants* | | |
| Noradrenaline | 4-8 mg. in 1000 ml 5% G/W or G/S by slow drip | May increase cardiac output. Tissue sloughing if extravasation. Rarely arrhythmia |
| Mephentermine sulphate | 5-20 mg. by injection or 35-75 mg /500 ml 5% G/W by infusion | Increases coronary blood flow. Stimulates myocardium with resultant increased force of contraction Somewhat delayed but prolonged action |
| Metaraminol bitartrate (Aramine) | 0.5-5 mg. by injection or 25-100 mg 500 ml 5% G/W by infusion | Increases peripheral resistance and coronary blood flow |
| *Beta-receptor stimulants* | | |
| Dopamine | 20 mcg/kg/min | Increases renal blood flow. May cause ectopic rhythm |
| Isoproterenol | 2-8 mcg/min | Direct inotropic effect on heart May cause vent arrhythmia |
| *Alpha-receptor blocking agents* | | |
| Phenoxybenzamine | 0.2-2 0 mg/kg | Fluids must be given simultaneously |

weakness and wasting. (f) Intercostal nerve—Severe pain along distribution of the nerve.

2. *Oesophagus*—Dysphagia.
3. *Vessels*—(a) Superior vena cava—venous engorgement of head and neck. (b) Azygos vein—dilatation of superficial veins on thorax. (c) Thoracic duct—chylous effusion. (d) Axillary vessels—Loss of peripheral pulses and oedema of arm.
4. *Erosion of rib*—Local pain and bony tenderness.
5. *Invasion of heart and pericardium*—resulting in arrhythmias, or signs of pericardial effusion and CCF.

IV. **Symptoms due to metastasis—**

1. *Lymphatic spread*—Involvement of mediastinal lymph nodes and later the neck.
2. *Blood borne metastasis*—(a) Intracranial commonest with headache, visual disturbance, dysphasia, confusion, epilepsy and hemiplegia. (b) Hepatic secondaries. (c) Skin, subcutaneous and muscle metastases which may form slowly and be relatively painless.
3. *Bronchogenic*—in same lung or in the other lung.

V **Symptoms due to non-metastatic extrapulmonary manifestations—**

1. *Endocrine and metabolic*—(a) Cushing's syndrome (ACTH) commonest (b) Dilutional hyponatremia (ADH). (c) Hypercalcemia (Osteolytic secondary to PTH). (d) Hypoglycemia (insulin). (e) Hyperthyroidism (TSH). (f) Gynecomastia.
2. *Skeletal*—Clubbing, hypertrophic pulmonary osteoarthropathy.
3. *Skin*—Acanthosis nigricans, pruritus, eczematoid and bullous rashes.
4. *Neurological*—(a) Encephalopathy with dementia, cerebellar damage or leucodystrophy. (b) Cerebellar degeneration. (c) Extrapyramidal syndrome. (d) Myelopathy. (e) Neuropathy. (f) Myasthenia. (g) Motor neurone disease.
5. *Muscular*—Polymyositis, dermatomyositis.
6. *Vascular*—Thrombophlebitis migrans, non-bacterial endocarditis.
7. *Haematological*—Haemolytic anaemia, thrombocytopenia, red cell aplasia.

Signs—Groups :

1. *Signs of collapse*—A single lobe or a whole lung may be involved.
2. *Signs of consolidation.*

## ESSENTIAL HYPERTENSION

**Etiology:**

(1) Age—any. (2) Sex—Below 40 males more than females, thereafter the position is reversed (3) Hereditary tendency. (4) Constitution—usually obese. (5) Diabetes predisposes. (6) Emotion—Emotional and stressful situations can elevate the arterial pressure (7) Salt intake—Salt intake can become critical in the presence of some predisposing factor such as renal disease. (8) Hyperreaction to cold pressor test—Immersion of hand in water at 3-5°C for one minute may cause rise of more than 20 mm Hg. in systolic and 15 mm in diastolic pressure.

**Theories of causation:**

1. *Renal theory*—Experimental production of hypertension by renal ischaemia. In animal experiments if the normal kidney has been protected from high blood pressure by renal artery clip, removal of the protection causes the healthy kidney to lower the arterial pressure to normal by excretion of salt and water. Where the kidney is not protected it suffers vascular damage and as a result is incapable of excreting the appropriate salt and water to lower the pressure to normal.
2. *Endocrine theory*—(a) Adrenal gland—(i) Hypertension associated with hyperfunction of adrenal cortex, e.g. Cushing's syndrome. (ii) Toxemia of pregnancy with its associated hypertension may be related to adrenocortical steroids which are found in the placenta (iii) Experimental production of hypertension by adrenocortical steroids. (iv) Amelioration of hypertension by adrenalectomy. (v) Effect of aldosterone and sodium on blood pressure; in hyperaldosteronism hypertension is an essential element. (b) Pituitary—High incidence of hypertension in acromegaly.
3. *Humoral factors* (Renin-angiotensin-aldosterone system)—Ischaemic kidney produces excess of renin which combines with angiotensinogen (formed in the liver and normally present in plasma) to form angiotensin I. On combining with a converting enzyme, Angiotensin II a potent pressor substance is formed. Angiotensin causes the adrenal cortex to secrete aldosterone.
4. *Neurogenic theory*—(a) *Interaction of the nervous system*—Angiotensin raises arterial pressure largely by stimulation of sympathetic pathways. On the other hand nervous influences, acting through increased sympathetic discharge,

**Management:**

1. *Surgery—Indications*—A patient best suitable for resection is not more than 65, of good physique and with the growth confined within the substance of the lung. *Contraindications*—(a) Distant metastasis. (b) Mediastinal involvement—Vocal cord paralysis, vena cava obstruction, oesophageal involvement, positive scalene node biopsy, involvement of carina or trachea, blood stained pleural effusion. (c) Poor respiratory function. (d) Advanced age. (e) Most oat-cell tumours. (f) Extension to chest wall.
2. *Irradiation therapy*—Best indication is inoperability. Helpful palliative for distressing symptoms such as haemoptysis, cough and chest pain. Can temporarily relieve superior vena cava obstruction, or compression of oesophagus or major bronchus.
3. *Chemotherapy*—Of particular value in rapidly reaccumulating malignant pleural effusion. Cyclophosphamide (Endoxan) 200 mg. daily IV or IM upto a total of 40 gm If white cell count shows tendency to fall, 200 mg. every 2-3 days After the patient is subjectively improved and the size of tumour has decreased and white cell count is satisfactory, 100-200 mg. daily by mouth

## 12. PULMONARY OEDEMA

**Definition**—The term pulmonary oedema may be regarded as an increase in the fluid content of the extravascular tissues of the lung.

**Causes:**

A. **Cardiogenic**—

1. L V. failure.
2. Myocardial infarction.
3. Mitral stenosis.
4. Cardiac arrhythmias.
5. L A. myxoma.
6. Hypertensive encephalopathy.
7. Pulmonary infarction.

B **Non-cardiogenic**—

1. Fluid overload (overhydration).
2. Neurogenic—Fracture skull, encephalitis, post-ictal state, increased intracranial pressure.
3. Near-drowning.
4. Shock.
5. Infections—Endotoxins from gram negative septicemia, pneumonia and bronchopneumonia.
6. Inhalation of noxious fumes and gases—Nitrogen dioxide, chlorine, hydrogen sulphide, sulphur dioxide, ammonia,

6. *Radiology*—LV dense, left border more rounded (boot shaped heart) and sinking deeply into left dome of diaphragm. Prominent aortic knob and unfolding of aortic arch.

**Complications:**

1. *Heart failure*—(i) LVF followed by congestive failure, or (ii) CCF without preceding LVF due to hypertrophied ventricular septum encroaching on right ventricular cavity (Bernheim's syndrome).
2. *Angina pectoris*—usually with transient rise of blood pressure.
3. *Cerebrovascular accident*—Cerebral haemorrhage, thrombosis or subarachnoid haemorrhage
4. *Aortic dissection.*
5. *Hypertensive encephalopathy.*
6. *Malignant hypertension*—can occur in hypertension from any cause except coarctation of aorta. Triad of papilloedema, proteinuria, and diastolic pressure persistently over 130 mm Hg. Death within few months if untreated.
7. *Renal damage*—Trace of proteinuria and hyaline casts common Renal failure in malignant hypertension.
8. *Haemorrhages*—Epistaxis, rarely hematemesis or hemoptysis.

**Management:**

I. **General measures**—(a) Patient may be told about high B P. (b) Continuous medical observation. (c) Avoid excessive mental and physical strain, overeating and smoking.

II. **Diet**—Reduction of weight in obese patients to eliminate an added burden on the heart Salt restriction—Salt should not be added to food at table and less salt should be used in cooking Low sodium diet (less than 5 gm. salt) of more palatable and varied composition are as effective as the rice fruit diet (Kempner's diet).

III **Antihypertensive therapy**—

*Indications*—1. Malignant hypertension. 2 Hypertensive heart disease e g LVF 3. Diastolic pressure 110 or more. 4. Males under 40 because the prognosis is poor if untreated 5. Family history of early deaths due to hypertension. 6 Renal failure with blood urea 60-80 mg.

*Contraindications*—1. Renal failure with blood urea more than 100 mg./100 ml. 2. Severe cerebrovascular disease including mental symptoms. 3. Carotid or basilar insufficiency. 4. Previous cardiac infarction.

son's syndrome. (5) Treatment of specific cause if identified e.g. emergency mitral valvotomy, control of systemic hypertension, treatment of septicemia, etc.

## 13. COR PULMONALE (Pulmonary Heart Disease)

**Classification:**

1. *Acute*—Acute pulmonary embolism.
2. *Subacute*—(a) Asphyxial—Acute-on-chronic bronchitis, severe asthma. (b) Malignant—Miliary carcinomatosis of lung, lymphangitic carcinomatosis.
3. *Chronic cor pulmonale.*

### Pulmonary Embolism

**Classification:**

1. MASSIVE PULMONARY EMBOLISM—occurs when large thrombi lodge in the central pulmonary arteries causing obstruction to 50% or more of the pulmonary arterial tree. Classical triad of sudden onset of acute respiratory distress, severe chest pain, syncope and shock. Often fatal. (see below).
2. PULMONARY INFARCTION—found commonly in patients with cardiac disease. Triad of pyrexia, tachycardia and increased respiratory rate. Pleuritic pain, haemoptysis and pleural rub due to infarction.
3. RECURRENT PULMONARY THROMBO-EMBOLISM—of small thrombi which lodge in peripheral branches of pulmonary artery resulting ultimately in obstructive pulmonary hypertension.

### ACUTE MASSIVE PULMONARY EMBOLISM

**Etiology:**

1. SOURCE OF CLOT—(a) *Thrombophlebitis*—of veins of calves or pelvis. Increased risk due to trauma especially lower limb fractures, surgery especially abdominal and pelvic, prolonged bed rest, CCF, oestrogen therapy including oral contraceptives, sepsis, cancer, postpartum, age 50 and above, obesity and previous deep vein thrombosis. (b) *Heart*—Myocardial infarction, mitral stenosis, subacute bacterial endocarditis, isolated myocarditis.

2. PRECIPITATING FACTORS—Straining at stool, out of bed or wheel chair, or paroxysm of cough.

**Symptoms:**

1. *Circulatory collapse*—due to sudden reduction in cerebral and coronary blood flow from obstruction to RV outflow.
2. *Dyspnoea*—of sudden onset. Tachypnoea and hyperventilation. Asthmatic breathing if reflex bronchospasm.

| *Drug and Mode of action* | *Daily Dose* | *Side effects and comments* |
|---|---|---|
| (c) *Combined beta and alpha-blockers* | | |
| Labetolol | 200-800 mg | No cardioselectivity, no sympathomimetic activity. |
| (5) *Monoamine oxidase inhibitor* | | |
| Pargyline hydrochloridle (Eutonyl) | 10-50 mg | Reaction to tyramine containing foods such as cheese. Brightens emotional outlook hence useful in depressed hypertensives |
| **II. Diuretics** (See page 200) | | |
| **III. Vasodilators** | | |
| Hydralazine | 75-200 mg. | May cause reflex tachycardia, disseminated lupus (high dose), flush, nausea. Useful in renal failure. |
| Prazosin | 6-20 mg | Less reflex tachycardia but may cause "first dose" hypotension and dry mouth |
| Minoxidil | 20-40 mg | Hypertrichosis. Fluid retention |
| Indapamide | 2 5 mg | Relatively free from side effects. |

IV **Symptomatic management—**

1. HYPERTENSIVE CRISIS—Hypertensive encephalopathy, hypertensive L V. failure unresponsive to routine treatment, a rising B P. in patient with preeclampsia or renal failure, renal haemorrhages, exudates or papilloedema; and bleeding from a subarachnoid haemorrhage. Diastolic B. P usually over 150 mm. Hg

*Treatment*:

| *Drug* | *Dose & Route* | *Action* Onset | *Action* Max | *Adverse effects* |
|---|---|---|---|---|
| A *Quick acting* | | | | |
| 1. Diazoxide | 300 mg IV | 1 5-2 min | 3-4 min. | Excessive fall of B P., Salt and water retention, tachycardia, nausea and vomiting, fever |
| 2 Trimethaphen (Arfonad) | 5 mg IV infusion | <2 min | 2-5 min | Acute urinary retention, shock, paralytic ileus, decreased renal function. |

4. *Antibiotics*—to prevent secondary infection.
5. *Vasopressor drugs*—for shock.
6. *Aminophylline*—IV helps to relieve dyspnoea. 250-500 mg. in 500 ml. 5% glucose.
7. *Digitalis*—Rapid digitalization for heart failure—Digoxin 1 mg. IV followed in one hour by 0.5 mg.
8. *Correction of acidosis*—100 ml. of 7.5% sodium bicarbonate IV.
9. *Thrombolytic therapy*—Streptokinase—250,000-500,000 units in dextrose or normal saline IV over 30 minutes followed by maintenance dose of 100,000-150,000 units/hour for 72 hours. Estimation of thrombin clotting time should be done daily, ideal being 3 times normal.

B **Surgical—**

*Pulmonary embolectomy*—Indications—(1) Patient with massive embolism who shows evidence of deterioration after initial improvement. (2) Failure of conservative measures to help a seriously ill patient within one hour.

PREVENTION OF FURTHER EMBOLISATION—(1) General measures—Elevation of legs in order to collapse the veins. Use of elastic stockings. Leg exercises in the form of pressing the feet against the foot of the bed several times a day. (2) Anticoagulants. (3) Inferior vena cava ligation or better clipping of inferior vena cava with specially designed clip. Indications—(a) Embolization in patients receiving anticoagulants. (b) Anticoagulants are contraindicated. (c) Diseases predisposing to venous thrombosis and pulmonary embolism are prominent and persistent. (d) Septic embolism.

## Chronic Cor Pulmonale

**Definition**—Hypertrophy of the right ventricle resulting from diseases affecting the function and/or the structure of the lung, except when these alterations are the result of diseases that primarily affect the left side of the heart or of congenital heart disease.

**Causes:**

1. *Disorders of lung parenchyma*—
   (a) Chronic airways obstruction—Chronic bronchitis, bronchial asthma, emphysema.
   (b) Infiltrative, fibrotic and inflammatory lung disease—Tuberculosis, bronchiectasis, pneumoconiosis, radiation fibrosis, sarcoidosis, cryptogenic fibrosing alveolitis, extrinsic allergic alveolitis, scleroderma.

3. *Past history*—of previous inflammatory renal disease. History of renal trauma, hematuria or flank pain may suggest unilateral disease as cause of inflammation. In females history of pyelonephritis or toxemia during pregnancy. History of oral contraceptives must be obtained from all hypertensive women of child-bearing age.

4 *Occupation*—Lead poisoning in compositors, potters, painters and accumulator makers.

5. *Symptoms occurring in paroxysmal manner*—Paroxysms of headache, palpitation or flushing suggest pheochromocytoma. Also excessive sweating.

6 *Symptoms of renal disease*—polyuria, nocturia, etc.

7. *Symptoms of intracranial tumour*—Headache, vomiting and disturbances of vision.

8 *Symptoms suggestive of aldosteronism*—Muscular weakness, polyuria and polydipsia and tetany or paraesthesia.

9. *Features of Cushing's syndrome*—Weight gain, hirsutism, striae, and menstrual irregularities.

II **Physical Examination:**

1. *Repeated observations of B P.*—to distinguish between transient and sustained hypertension. Causes of transient hypertension—(a) Acute nephritis. (b) Toxemia of pregnancy. (c) Pheochromocytoma (d) Neurogenic hypertension—increased intracranial pressure, bulbar poliomyelitis, porphyria. (e) Administration of monoamine oxidase inhibitor drugs with certain foodstuffs like cheese. (f) Excessive ingestion of licorice sweets.

2. *Examination of heart*—For coarctation of aorta, cardiac enlargement

3. *Pulse*—Diminished or delayed femoral pulse and evidence of collateral circulation in coarctation of aorta.

4. *Abdomen*—For presence of kidney lump in polycystic disease or hydronephrosis, rarely pheochromocytoma may be felt as a tumour. Careful auscultation of upper abdomen and posteriorly in renal angle should be done in every patient with hypertension. In some patients with stenosis of renal artery, a systolic murmur or a continuous murmur may be heard over the epigastrium, umbilicus, or over lumbar spine or muscles. An abdominal bruit may also be heard in coarctation of abdominal aorta.

5. *Signs of Cushing's syndrome*—Abdominal striae, truncal obesity, moon face.

6 *Nervous system examination*—if symptoms suggestive of intracranial tumour.

(b) *Chemotherapy*—for secondary infection.
(c) *Avoidance of bronchial irritants*—such as smoking.
(d) *Improvement of ventilation*—(i) Relief of bronchospasm with bronchodilators or if persistent corticosteroids by mouth. (ii) Reduction of stickiness of sputum by liquefaction and lowering of surface tension by inhalation of trypsin and detergents. (iii) Oxygen —intermittently to relieve anoxia and central cyanosis. The possibility of carbon dioxide narcosis resulting from oxygen therapy must be borne in mind. Respiratory stimulants such as nikethamide 2-5 ml. IV if respiratory failure in spite of oxygen.

2. *Management of right heart failure*—Digitalis may not be of benefit and should be used with caution. Diuretics can improve blood gas tensions during oedematous stage.
3. *Mechanical assistance*—Respirators may be required to increase alveolar ventilation, and some patients need tracheostomy.
4. Surgical treatment—Surgical removal or obliteration of large bullae.

## 14. FUNGAL INFECTIONS OF THE LUNG

**Predisposing causes**—Usually opportunist infection due to—(i) States of general debility such as malnutrition, diabetes mellitus, cachexia of malignant disease, blood dycrasias, and lymphomas. (ii) Local damage to respiratory tract due to previous inflammatory, neoplastic, allergic or vascular disease. (iii) Iatrogenic—(a) Antibiotics, especially broad spectrum such as tetracyclines. (b) Corticosteroids. (c) Cytotoxic and antileukemic drugs. (d) Immunosuppressive drugs used for example in transplant surgery.

**Classification:**

1. **Diseases due to actinomycetes—**

(a) ACTINOMYCOSIS—Pulmonary variety usually results from inhalation of the organism, but the lungs may also be infected via blood stream or by spread through diaphragm via abdomen. It produces chronic suppurative and granulomatous disease of one or both lungs, usually lower lobes. Pleura may be involved with resultant empyema. Abscesses and sinuses may form on chest wall. *X-ray*—Irregular areas of consolidation and erosion of ribs. Sputum shows sulphur granules and culture will grow typical colonies. *Treatment*—Benzyl penicillin 2 mega units 8-hourly for 6 weeks, followed by Procaine penicillin 600,000

(d) *Renal arteriography*—Visualization of renal arteries may reveal presence or absence of renal vascular occlusion, major narrowing or maldevelopment.

(e) *Isotope renography*—painless and safe. (i) Gives assessment of overall renal function. (ii) Confirms or refutes presence of unilateral obstruction to renal flow in pelvis or ureter. (iii) A narrowed renal artery will delay uptake in excretion if blood flow is significantly diminished.

(f) *Differential urine analysis* (Howard's test)—The ischaemic kidney excretes urine more slowly than normal. During retrograde pyelography, the ureteral catheters are left in place and the urine collected from both kidneys. A decrease of atleast 15% of sodium concentration and of atleast 50% of urinary volume on the same side suggests possibility of renal arterial narrowing.

(g) *Plasma renin activity* (PRA)—Renin assay in peripheral and renal venous blood—Less time consuming than Howard's test and less discomfort to the patient. Based on the principle that increased renin release occurs with reduction in renal blood flow secondary to obstruction of renal artery. Blood is collected from both renal veins by selective catheterisation and analysed. Renovascular hypertension is suggested by finding increased renal vein renin activity on affected side in a ratio more than 1.5 as compared to unaffected kidney.

(h) *Renal biopsy*—In a paitent with evidence of renal involvement such as chronic pyelonephritis renal biopsy may help in establishing a diagnosis, or suggesting further investigations which may lead to a correct diagnosis.

(i) *Arterial pressure measurements*—Demonstration of a drop in pressure across a suspected arterial stenosis confirms the diagnosis.

2. INVESTIGATION OF ENDOCRINE HYPERTENSION

*Screening tests*—(a) Cushing's—Urinary 17-hydroxycorticosteroid estimation. (b) Pheochromocytoma—Urinary vanillyl mandelic acid (VMA) twice the normal. (c) Primary aldosteronism—Low serum potassium ($<$ 3.5 mEq/1). Elevated plasma aldosterone and increased aldosterone excretion. With increased aldosterone excretion elevated PRA suggests reno-vascular hypertension, low PRA suggests primary aldosteronism. (Also see Chapter V).

## 13. HEART MUSCLE DISEASE

**Definition**—Heart muscle disease represents a pathological disorder specifically of the heart muscle in which mechanical

(ii) *Aspergilloma*—Inhaled aspergillus develops within a pre-existing cavity and gradually enlarges to form a fungus ball (mycetoma). These usually occur in upper lobes. The condition is often asymptomatic, but occasionally haemoptysis or secondary infection draws attention to its presence. X-ray shows an opaque mass lying loosely in the cavity leaving a 'halo' of air between the mycelial ball and the wall of the cavity. *Management*—Small thoracotomy to evacuate the aspergilloma and irrigation of cavity with Nystatin paste or Natamycin. Clotrimazole by mouth also effective.

(iii) *Invasive*—Rarely the aspergillus spreads into the lung, and may enter blood stream and infect organs outside the thorax.

(b) PHYCOMYCOSIS (Mucormycosis)—Inhalation of the spore produces an acute pulmonary infection often associated with infarction which may take the form of acute pneumonitis with cavitation. *Treatment*—Amphotericin-B and surgical excision of any chronic localised lesion.

**4. Diseases due to dimorphic fungi—**

(a) HISTOPLASMOSIS—caused by Histoplasma capsulatum. Primary lesions often calcify and produce hilar and miliary calcifications which are spherical and may show small air-space haloes. A secondary stage of more progressive disease produces fever, and emaciation with visceral involvement It may mimic tuberculosis or produce tumour-like masses (Histoplasmoma). Diagnosis depends upon positive culture. Serological tests show specific complement fixing antibody. *Treatment*—Amphotericin-B for several weeks.

(b) COCCIDIOIDOMYCOSIS—due to Coccidioides immitis. Most infectious of all systemic mycoses Natural history like histoplasmosis with relatively benign primary infection which may be accompanied by erythema nodosum. Later a secondary progressive, potentially fatal form of the disease may follow with miliary or bronchopneumonic pulmonary lesions, and possibly spread to extrathoracic tissues such as skin and bones. X-ray—Cavities with fluid levels, occasionally granulomatous lesion resembling tuberculoma or neoplasm Diagnosis by isolation of organism in sputum and rising titre of complement fixing antibody. *Treatment*—Amphotericin-B. Surgery for localised persistent chronic lung lesions.

(c) BLASTOMYCOSIS—due to Blastomyces dermatitides causes granulomatous and suppurative lesions presenting as subacute

body and formerly known as secondary cardiomyopathy has now been designated 'rare specific heart muscle disease'.

**Classification:**

1 **Congestive (dilated) cardiomyopathy (COCM)**—Severe ventricular failure resulting from poor systolic function. LV dilated.

CAUSES—*Risk factors* are—Alcohol, pregnancy (late stage) and puerperium, systemic hypertension, infections, immunological disorders.

CLINICAL FEATURES:

*Symptoms*—Dyspnoea, anginal pain, syncope and palpitation. Sudden death may occur.

*Signs*—In presence of obstruction, 3 cardinal signs are—(i) Abrupt, jerky arterial pulse of normal volume. (ii) Double impulse—A powerful LV thrust preceded by a palpable left atrial thrust, best appreciated with the patient lying on the left side. (iii) Late systolic murmur loudest at the left sternal edge, and also heard at the apex.

*X-ray*—Large flask-shaped heart.

*E.C G.*—Sinus tachycardia or atrial fibrillation. Non-specific ST changes. Q waves suggesting cardiac infarction may be seen.

DIFFERENTIAL DIAGNOSIS· Common causes of heart failure must be excluded.

(a) *Occult valvar disease*—specially where typical murmur of MS or AS is not heard because of very low cardiac output or high pulmonary vascular resistance, or AR with very soft murmur.

(b) *Ischaemic heart disease*—CCF does not occur in patients with IHD in absence of anginal pain, while majority of patients with COCM do not have anginal pain Sometimes diagnosis can only be made by coronary arteriography.

(c) *Cardiac aneurysm*—may present with heart failure of unknown cause. Congestive failure in IHD should suggest possibility of ventricular aneurysm. LV angiography may be essential for diagnosis.

(d) *Rare heart muscle diseases and Drugs*—must be excluded by examination of other systems Emetine, cobalt, catechol amines and allergic myocarditis due to drugs such as penicillin can affect the myocardium.

TREATMENT—(i) Prolonged bed rest. (ii) Digitalis and diuretics for heart failure (iii) Vasodilators —Arterial vasodilators such as hydralazine aid LV emptying. Venous dilators like nitroglycerin (by inunction for prolonged effect) to relieve pulmonary congestion.

**Clinical picture:**

**I. Thoracic sarcoidosis—**

1. BILATERAL HILAR LYMPH NODE ENLARGEMENT (BHL)—Symptoms are cough, weight loss and erythema nodosum, and at times febrile polyarthralgia involving larger joints. Resolution of lymph nodes occurs within two years in 90%.
2. PULMONARY SARCOIDOSIS—Lung shadows may coincide with BHL, develop as nodes are resolving, or may occur without evidence of BHL. *X-ray* shows widespread shadowing usually bilateral, symmetrical and tending to be more dense in the middle third of the lung fields. Shadows generally clear spontaneously within two years, but if the lesions persist lung fibrosis supervenes with the middle zones becoming denser and strand-like opacities spreading out from the hilar region. *Symptoms*—(a) *Prefibrotic stage*—none or dry cough. Fever and weight loss. (b) *Fibrotic stage*—Progressive effort dyspnoea and eventually death from cardio-respiratory failure.

**II. Extrathoracic lesions—**

1. *Ocular*—Uveitis in about 20%. Uveoparotid fever is characterised by uveitis, enlargement of the parotid and sometimes lacrimal glands, facial palsy and prolonged fever.
2. *Reticuloendothelial system*—Slight enlargement of peripheral lymph nodes particularly cervical. Splenic enlargement may be associated with hypersplenism.
3. *Skin*—Small nodular infiltrations and/or erythema nodosum. Lupus pernio, sarcoid plaques and large nodular infiltrations associated with unfavourable prognosis.
4. *Nervous system*—Sarcoid deposits may cause multiple cranial nerve palsies, meningoencephalitis, intracerebral deposits, transverse myelitis, hypopituitarism, diabetes insipidus and peripheral neuropathy.
5. *Bones*—Bone cysts (punched out), or general rarefaction of terminal phalanges.
6. *Heart*—Arrhythmias or heart block, rarely heart failure due to muscle involvement.
7. *Hypercalcemia and nephrocalcinosis.*

**Diagnosis:**

1. *Biopsy*—of enlarged superficial lymph nodes, skin lesions and follicular conjunctival lesions; other sources are liver, lung or scalene node biopsy.
2. *Kveim test*—Intradermal injection of 0.1-0.2 ml. of suspension of human sarcoid tissue. Positive test after 6 weeks in

*E.C.G.*—Left atrial P wave. Low voltage QRS complexes usual.

*Catheterization*—Ventricular pressure trace illustrates diastolic 'dip and plateau' pattern.

*Angiography*—reveals mass of tissue in ventricle, and in right sided EMF giant RA.

TREATMENT—Surgical stripping of thickened endocardium and replacement of mitral and tricuspid valves has been attempted.

ENDOCARDIAL FIBROELASTOSIS (EFE)—is an entirely different condition occurring in infants It leads to early heart failure involving LV and is commonly associated with left sided congenital abnormalities such as AS and coarctation of aorta

## III. Specific Heart Muscle Diseases

*Causes*—(1) Infiltration—Primary amyloid, sarcoidosis, hemochromatosis, leukemic deposits (2) Connective tissue diseases —SLE, rheumatoid arthritis, progressive systemic sclerosis, polyarteritis nodosa, Marfan's syndrome. (3) Neuromuscular disease—Friedreich's ataxia, muscle dystrophies, dystrophia myotonica. (4) Metabolic—Glycogen storage disease, carcinoid, porphyria, cobalt. (5) Endocrine disorder—Acromegaly, myxoedema, hyperthyroidism (6) Antineoplastic drugs—Doxorubicin, daunorubicin.

*Clinical features*—Usually those of congestive cardiomyopathy.

## IV. Cardiac Tumours

MYXOMAS

LEFT ATRIAL MYXOMA—*Clinical features*—(1) Systemic emboli may occur since tumour tissue is soft (2) Dyspnoea is caused by the tumour swinging down and obstructing the mitral valve with resultant pulmonary congestion. Syncope may occur. (3) Changing mitral murmurs may occur with varying mitral obstruction (4) Constitutional symptoms—Fever, weight loss, anaemia. Very high ESR and abnormal serum proteins Diagnosis —Echocardiography and angiography will show the tumour Treatment—Surgical excision.

RIGHT ATRIAL MYXOMAS—are rare They produce right sided heart failure and repeated pulmonary emboli

## 14. NEUROCIRCULATORY ASTHENIA

**Definition**—Neurocirculatory asthenia (effort syndrome, soldier's heart or anxiety neurosis) is a condition of ill health of psychogenic or neurogenic origin characterised by a group of symptoms and a general incapacity in adjusting to physical or mental strain, especially in hypersensitive individuals who in extreme cases may show the condition more or less constantly with little or no provocation.

(2) *Occupational dust disease* (Pneumoconioses)—Silicosis, coal miner's pneumoconioses. Asbestosis, other silicates (talc, kaolin), aluminium, beryllium. Synthetic fibre dusts.
(3) *Allergic dust disease*—Farmer's lung, bird fancier's lung, malt worker's lung, mushroom grower's lung, ventilation pneumonitis.
(4) *Chronic infections*—Tuberculosis, bronchiectasis, viral pneumonias, aspergillosis, fibrocystic disease.
(5) *Granulomatous diseases*—Sarcoidosis, Wagner's granulomatosis.
(6) *Drugs and Chemicals*—Nitrofurantoin, cyclophosphamide, methotrexate, busulphan, bleomycin, salazopyrin, oxygen, paraquat.
(7) *Collagen and autoimmune disease*—Rheumatoid disease, systemic sclerosis, polymyositis, SLE, chronic active hepatitis, thyroiditis, ankylosing spondylitis, Sjogren's syndrome, renal tubular acidosis, ulcerative colitis.
(8) *Vascular disorders*—Thromboembolic disease, pulmonary veno-occlusive disease, pulmonary venous hypertension e.g. mitral stenosis, Goodpasteur's syndrome, polyarteritis, shock-lung syndrome.
(9) *Neoplasms*—Alveolar cell carcinoma, lymphangitic carcinomatosis.
(10) *Miscellaneous*—Uremia, alveolar proteinosis, histiocytosis-X, neurofibromatosis, ionizing radiation.

**Symptoms:**

1. Cough—with expectoration, cough usually periodic.
2. Dyspnoea—proportional to extent of lung involved.
3. Symptoms of primary affection—e.g. bronchiectasis, tuberculosis, etc.

**Signs:**

*Local*—Inspection—Retraction of affected side, limitation of movements. Palpation—Displacement of heart to same side if lower lobe involved, shift of the trachea if fibrosis of upper lobe. T.V.F. diminished. Percussion—Impaired or dull note Auscultation—Feeble breath sounds. Foreign sounds absent or if cavitation rhonchi and rales.

*General*—Clubbing of fingers, cyanosis, emaciation, dyspnoea. Cough, sputum and haemoptysis if complicated by bronchiectasis.

**Diffuse fibrosing alveolitis** (Hamman-Rich syndrome)—

*Etiology*—Cause unknown, probably hypersensitive phenomenon. Majority of patients 40 years or older.

which aggravate symptoms A depressive disorder as the cause of the cardiac symptoms should be excluded.

(ii) Sedatives or tranquillizers may help.

## 15. PERICARDITIS

**Causes:**

1. *Idiopathic (nonspecific or benign).*
2. *Infections*—(a) *Bacterial*—(i) Tuberculous, (ii) Pyogenic—Intrathoracic infection e.g. pneumonia, empyema, septicemia or penetrating wounds of chest (b) *Viral*—Acute recurrent pericarditis, infectious mononucleosis, coxsackie virus, chicken pox. (c) *Fungal*—Actinomycosis, histoplasmosis. (d) *Protozoal*—Amoebiasis, toxoplasmosis (e) *Parasitic*—Echinococcus, cysticercus. (f) *Spirochetal*—Syphilitic.
3. *Acute myocardial infarction.*
4. *Connective tissue disorders*—Rheumatic fever, rheumatoid arthritis, systemic lupus erythematosus, systemic sclerosis, polyarteritis nodosa, giant cell arteritis.
5. *Uremia.*
6. *Tumours and infiltrations*—Carcinoma of lung and oesophagus, primary cardiac tumours, reticulosis, leukemia.
7. *Postmyocardial infarction and postcardiotomy syndromes.*
8. *Dissecting aneurysm*
9. *Trauma*—Thoracic surgical procedures, diagnostic procedures, transvenous cardiac pacemaker.
10. *Radiation therapy.*
11. *Drugs*—Hydrallazine, procainamide, INH, anticoagulants, penicillin, phenylbutazone.
12. *Serum sickness.*
13. *Myxoedema.*
14. *Addison's disease.*
15. *Chylopericardium.*
16. *Miscellaneous*—Sarcoidosis, amyloidosis, multiple myeloma.

### I. Acute (dry) pericarditis

**Symptoms:**

*Onset*—Abrupt with chills, fever and precordial pain, or insidious.

1. *Chest pain*—Main symptom. (i) Pleuritic pain aggravated by change of position, deep inspiration, coughing or swal-

(a) **Due to inorganic dusts—**

(i) *Silicosis*—caused by inhalation of free silica in quarrying and rock-drilling of quartz, flint, and sandstone. Stages—(a) Bronchial with shortness of breath and exaggeration of linear markings on x-rays. (b) Nodular with discrete shadows in lung tending to coalesce. (c) Infective phase with fibrosis due to chronic tuberculous infection. Talc pneumoconiosis may be a modified silicosis.

(ii) *Coal workers' pneumoconiosis* (Anthracosis)—In contrast to silicosis there is greater tendency for patient to develop cough and chronic bronchospasm and subsequent emphysema.

(iii) *Asbestosis*—Asbestos, a fibrous mineral, is responsible not only for pneumoconiosis, but for pleural fibrosis and bronchogenic carcinoma.

(iv) *Pneumoconiosis due to metal inhalation*—Iron (siderosis), beryllium (berylliosis), aluminium (aluminosis), tin (stannosis).

(b) **Due to organic dusts—**

(i) *Extrinsic allergic alveolitis*—The condition occurs among those exposed to heavy doses of inhaled mould spores or foreign particulate dried proteins of sufficiently small size to penetrate to the alveoli. Common examples are farmer's lung, bagassosis, mushroom picker's lung, wheat weevil disease, bird breeder's lung, pituitary snuff taker's lung, and suberosis (fungal contaminants of cork dust). Clinical features consist of— (a) Acute episodes of fever, headache, chills and malaise occurring within a few hours after exposure to the antigen and lasting for about 24 hours. (b) Cough, dyspnoea and basal creps. (c) Restrictive type of pulmonary disability due to pulmonary fibrosis leading ultimately to chronic cor pulmonale.

**Management:** Consists of prevention and symptomatic treatment e.g. for exudative disease following exposure to gases or fumes—Rest and warmth, positive pressure oxygen with if necessary mechanical ventilatory assistance, correction of hemoconcentration in some cases, broad spectrum antibiotics if signs of infection, corticosteroids IV for few days followed by oral prednisolone, and morphine in small doses to allay anxiety or pain.

*X-ray*—Both end-inspiratory and end-expiratory films are necessary, since the diagnosis is based on the mediastinal shift which occurs between the two films. In both atelactasis and obstructive emphysema the mediastinum shifts away from the abnormal lung on expiration; in atelactasis, the displaced mediastinum shifts back toward the midline on expiration, whereas in obstructive emphysema, the mediastinum shifts farther away from the midline on expiration.

3. Complete obstruction of bronchus—from mucus plugs as in postoperative atelactasis—leads to rapid atelactasis of the area of the lung distal to the obstruction due to complete blockage of airflow.

*Predisposing causes*—1. Sex—More in males 2 History of heavy cigarette smoking, chronic bronchitis or asthma, or postoperative respiratory infection. 3. Prolonged anaesthesia 4. Upper abdominal operation. 5. Failure to maintain proper bronchial toilet during and after surgery.

**Symptoms and Signs**—Fever, tachycardia and tachypnoea 24-48 hours after operation. Ineffectual cough. Dullness on percussion with diminished breath sounds over area of collapse. May occur in comatose states, neurological disorders with weakness of respiratory muscles, or after multiple rib fractures. *X-ray*—Opacification of involved area. Displacement of interlobar fissures surrounding collapsed lung. Mediastinum and trachea may be shifted towards affected side Elevation of diaphragm on ipsilateral side. Compensatory hyperinflation may be noted in contralateral lung or uninvolved lobe in ipsilateral lung.

**Management:**

1. *Oxygen*—continuously.
2. *Relief of pain*—if present with small dose of morphine (10 mg.) or pethidine (50 mg.).
3. *Attempts to dislodge the obstruction by*—(a) Removal of secretions with mucolytics, bronchodilators and by postural drainage. The patient is postured with the affected side uppermost in order to initiate cough and expel the obstruction. If ineffective fist percussion over affected lung area for about 10 minutes every hour. (b) Bronchoscopic removal of offending plug of mucus if simple measures fail. If bronchoscopy is not possible, suction through catheter in trachea or failing this in pharynx.

**Investigations:**

1. *Radiology*—Triangular shaped heart with straightened right and left borders. Very little pulsation on screening (quiet heart). Calcification of pericardium diagnostic. A dilated superior vena cava is a valuable sign.
2. *E.C.G.*—Low voltage with inverted T waves. There may be atrial fibrillation.
3. *Cardiac catheterisation*—Elevated right atrial pressure with sharp $y$ descent and very prominent $x$ descent.
4. *Angiocardiography*—Right atrial angiocardiography reveals a gap usually of about 3-5 mm caused by the thickened pericardium.

B. DUE TO IMPAIRED FILLING OF LEFT HEART—Much less common. Patient presents with history of syncope on exertion with dyspnoea and evidence of pulmonary congestion

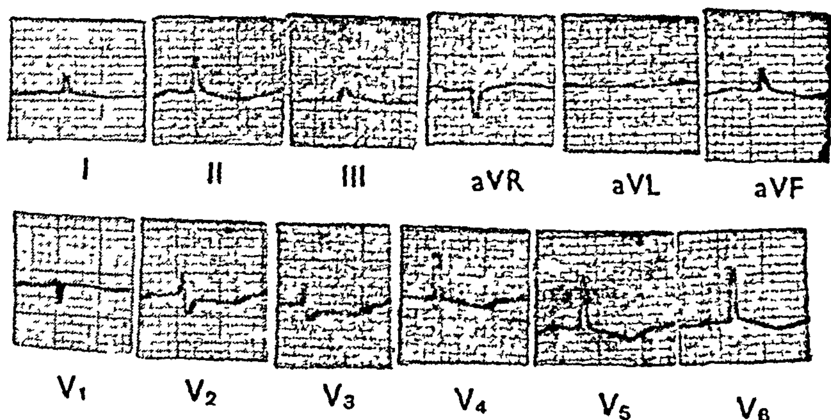



Fig 2 30 Low voltage complexes in constrictive pericarditis.

**Treatment**—Pericardiectomy with removal of the thickened pericardium from the anterior surface of the heart. Course of antituberculous therapy even in absence of active tuberculous infection.

## 16. PULMONARY HYPERTENSION

**Definition**—Pulmonary arterial pressure more than the upper limit of normal i.e., 30 mm Hg. systolic, 15 mm end-diastolic, or 20 mm mean.

**Causes:**

1. **Primary or idiopathic**—Cause unknown, mostly in women
2. **Secondary**—Elevation of pulmonary capillary and/or left atrial pressure—

1. *Due to hypoxia*—Central cyanosis, muscular incoordination, loss of judgment, dimness of vision, fatigue, dizziness, hypertension, tachycardia.
2. *Due to hypercapnia* ($CO_2$ narcosis)— Warm extremities, bounding pulse, small pupils, confusion or drowsiness, headache, depressed tendon reflexes, extensor plantars, papilloedema, coma.
3. *Respiratory distress or dyspnoea.*

**Diagnosis:**

$PO_2 < 8$ kPa (60 mm Hg)
$PCO_2 > 6.6$ kPa (50 mm Hg)

MANAGEMENT: In chronic bronchitis and emphysema.

1. *Maintenance of patent airway*—Nasal catheter to remove secretions and stimulate expulsive coughing. If secretions cannot be cleared by simple means, tracheostomy or endotracheal tube.
2. *Controlled oxygen therapy*—The aim of oxygen therapy is to control hypoxemia without allowing $CO_2$ retention to threaten life from respiratory acidosis. This can be achieved by: (a) Low concentration of $O_2$ (30%) by nasal prongs, ventimasks, or Edinburgh mask. (b) Repeated measurement of arterial blood gas tensions to ensure that the arterial $PO_2$ is maintained at over 6.6 kPa (50 mm Hg) without the arterial hydrogen ion activity rising above 56 nmol/litre (pH < 7.25). (c) By use of ventilatory stimulants or mechanical ventilation if these limits cannot be attained.
3. *Control of infection*—Ampicillin 500 mg with flucloxacillin 500 mg p.o. q.d.s. with 2 mega units of benzyl penicillin IM 12-hourly.
4. *Respiratory stimulants*—Doxapram (Dopram) is the most potent. It is given at a maximal initial dose of 15 mg/ minute by continuous IV infusion, increasing the dose to 30 mg/ minute if arterial pH continues to rise. Usually given for 24-72 hours. Nikethamide 2-10 ml. IV can be used instead of doxapram.
5. *Bronchodilators*—(a) Salbutamol, terbutaline or ipratropium bromide in high concentrations by IPPB. (b) Aminophyllin —0 5 gm slowly IV every 4-6 hours. (c) Corticosteroids IV.
6. *Treatment of acidosis*—with IV sodabicarb. Acidosis corrects itself if adequate alveolar ventilation is maintained.
7. *Mechanical ventilation*—if acid base balance cannot be maintained with Doxapram or Nikethamide, mechanical ventilation through a cuffed endotracheal tube should be

3. *Cardiac catheterisation*—Elevation of pulmonary arterial pressure, pulmonary vascular resistance greatly increased but wedge pressure normal.

**Differential Diagnosis :**

1. *'Damped' mitral stenosis*—High pulmonary vascular resistance with attacks of paroxysmal dyspnoea and pulmonary oedema. E C.G. shows P waves which are combination of P-mitrale and P-pulmonale.
2. *Eisenmenger complex*—History over many years, either sex (PPH is practically unknown in males), no giant 'a' waves, more central cyanosis rather than peripheral, pulmonary ejection murmur and thrill common. Angiocardiography shows bidirectional shunt.
3. *Subacute thrombo-embolic pulmonary hypertension*—See subacute cor pulmonale.

**Treatment**—No curative treatment. Long-term anticoagulant therapy may be given to prevent pulmonary thrombo-embolism Death usually within 5 years.

## 17. HEART DISEASE AND PREGNANCY

**Normal circulatory changes in pregnancy :**

1. *Blood volume*—increases gradually until term.
2. *Cardiac output*—rises by about 40% early in pregnancy and is maintained at this level upto term. After delivery it generally returns to normal after 2 weeks
3. *Venous pressure*—increases due to increase in blood volume
4. *Arterial pressure*—Systolic pressure is unchanged but diastolic pressure falls giving wide pulse pressure.
5. *Regional blood flow*—Blood flow to skin and uterus gradually increases Renal blood flow reaches maximum level in the first trimester and remains high thereafter.
6. *Pulse rate*—rises maximally between 8-10 weeks before delivery.

**Cardiovascular manifestations during pregnancy :**

SYMPTOMS—

1. *Dyspnoea*—at rest or on exertion, may be related to hyperventilation. Orthopnoea especially in later months of pregnancy.
2. *Palpitation*—In mid and late pregnancy and puerperium. May be due to awareness of normal heart beat because of increased stroke volume or dysrhythmia.

**Management:**

1. *Mechanical ventilatory support.*—Use of positive end-expiratory pressure (PEEP) technique. It maintains an end-expiratory pressure of 8-15 cm of water by imposing a threshold resistance during expiration and thus keeps open lung units which otherwise are likely to collapse and be unavailable for gas transfer.
2. *Drugs.*—(a) Antibiotics if specific infection. (b) Inotropic agents such as dopamine to increase cardiac output (c) Corticosteroids—not of proved value. May improve surfactant elaboration.

## 21. PNEUMOTHORAX

**Definition**—Pneumothorax means air in the pleural space, making an air containing pleural cavity. Air may enter the pleural cavity through the chest wall, mediastinum, or diaphragm, or from a puncture of the visceral pleura covering the lung. The term *spontaneous pneumothorax* refers to cases which are not due to trauma.

**Etiology:**

1. *Benign spontaneous pneumothorax*—Due to rupture of sub-pleural bleb either congenital or emphysematous or tearing of pleural adhesions.
2. *Tuberculous spontaneous pneumothorax*—Due to ulceration of active tuberculous lesion through the pleura, or rupture of local emphysematous area from old tuberculous scarring.
3. *Traumatic pneumothorax*—Stab wounds, crushing injuries, pleural or lung biopsy, fracture ribs, faulty tracheostomy, difficulty in inserting subclavian needle or catheter.
4. *Other non-tuberculous forms*—(a) *Infections*—such as acute bronchitis, pneumonia, bronchiectasis. (b) *Diffuse fibrosing pulmonary disease*—Sarcoidosis, pneumoconiosis, interstitial fibrosis. (c) Rarely pulmonary infarction, bronchial and pleural neoplasms.
5. *Secondary to spontaneous mediastinal emphysema*—Asthma, labour, straining at stool, rapid decompression in divers, airmen or astronauts, rupture of oesophagus
6. *Iatrogenic*—Percutaneous needle biopsy of lung, transbronchoscopic lung biopsy, use of mechanical ventilators, closed chest cardiac massage, intercostal nerve block, pericardiocentesis, transthoracic liver biopsy, stellate ganglion block, brachial plexus block. Surgical procedures at base

7. *Cyanotic attacks*—in cyanotic congenital heart disease may prove fatal to the mother as well as to the baby. They may respond to vasopressor drugs which increase systemic resistance, or propranolol which reduces right ventricular obstruction.
8 *Peripartal cardiomyopathy*—may lead to congestive failure in late pregnancy or puerperium especially in malnourished multiparous women.

B. SURGICAL MANAGEMENT—(a) *Mitral stenosis*—Mitral valvotomy preferably before 20th week if persistent pulmonary congestion despite adequate medical treatment. (b) *Congenital heart disease*—Surgical interference is seldom necessary during pregnancy.

C. OBSTETRIC MANAGEMENT—*Indications for termination of pregnancy*—(a) *Cardiac failure*—*Before 14th week*—Left sided failure if patient unsuitable for valvotomy, or CCF. *After 14th week*—LVF or CCF. If unsuitable for valvotomy, continuation of pregnancy unless deterioration. (b) *Other factors*—(i) Atrial fibrillation—if persistent. (ii) Primipara over 35, pregnancies in quick succession or associated other disease. (iii) Hypertension—Continuing rise of blood pressure, or malignant hypertension. (iv) Coronary heart disease. (v) Primary pulmonary hypertension. (vi) Congenital heart disease—Eisenmenger's complex. Evidence of development of dissection in coarctation of aorta.

**Management of labour**: (1) Second stage should be kept as short as possible with the use of forceps if needed. (2) Cardiac stress during labour is less if patient is kept on the side. (3) Oxygen and sedation with morphine should be used freely if patient is in distress. (4) Prophylaxis of bacteremia and bacterial endocarditis with Ampicillin 500 mg. at commencement of labour and 250 mg. six-hourly for 48 hours.

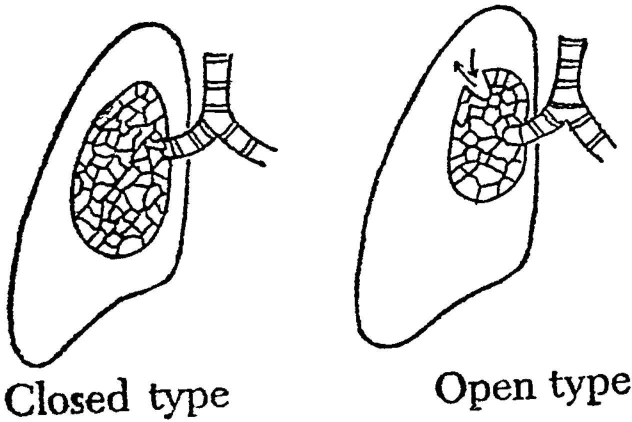
## 18. PAROXYSMAL DYSPNOEA

**Causes and Differential Diagnosis:**

I Cardiac conditions—

1. *Cardiac asthma*—

| | *Cardiac asthma* | *Bronchial asthma* |
|---|---|---|
| 1. *Past history* | Of hypertension, aortic or coronary disease | Of previous attacks of asthma or other allergic conditions in patient or other members of family |



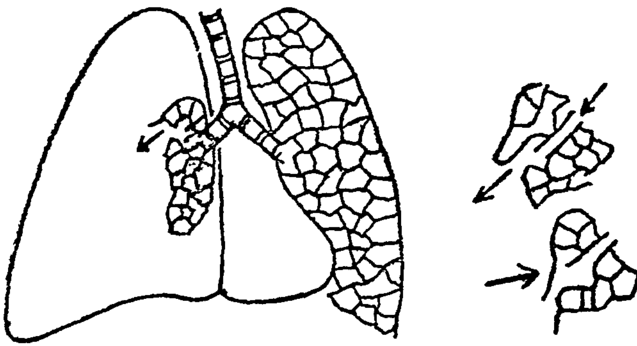




Fig. 31 Types of spontaneous pneumothorax. In closed pneumothorax the rupture gets sealed. In open type there is a bronchopleural fistula and the pleural pressure approximates atmospheric pressure. A check-valve mechanism leads to tension pneumothorax.

pot sound may be heard on percussion, (ii) on auscultation air can be heard passing to and fro through the opening, (iii) voice sounds and cough heard with metallic echo.

3. Tension pneumothorax—The opening is valvular and air can enter into the pleural space during inspiration but cannot escape during expiration so that a positive pressure occurs in the pleural cavity. The signs are :

(a) Displacement of mediastinum. (b) Increasing cyanosis and dyspnoea (c) Increasing rapidity of pulse. (d) Widening of intercostal spaces. (e) Hyperresonant or tympanitic note; note dull if intra-pleural tension very high. (f) Downward displacement of liver if right sided pneumothorax, and of diaphragm. (g) Positive coin test.

| | *Cardiac asthma* | *Bronchial asthma* |
|---|---|---|
| 6 *Investigations:* | | |
| (a) Eosinophilia | None | Common. |
| (b) E C G. | Left ventricular preponderance, acute myocardial infarction or bundle branch block | Normal or right ventricular preponderance |
| 7 *Response to treatment* | Responds to morphine and IV frusemide | Responds to bronchodilators |

2. *Acute myocardial infarction*—Pain, dyspnoea, vomiting and shock. Cardiac signs and E.C.G. changes.
3 *Acute right ventricular failure*—e.g., due to paroxysmal tachycardia, diphtheria, etc.
4 *Mitral stenosis*—Dyspnoea due to acute pulmonary congestion may follow severe exertion or excitement, infection or onset of atrial fibrillation. Diastolic murmur at apex.
5. *Aortic regurgitation*—Paroxysmal nocturnal dyspnoea often initial complaint. Cardiac and peripheral signs of aortic regurgitation
6 *Cardiac tamponade*—Due to rapidly accumulating pericardial effusion or hemopericardium Beck's triad of (a) falling arterial pressure, (b) rising venous pressure, (c) small quiet heart.

II **Lung conditions—**

1. *Bronchial asthma*—See table
2 *Acute bronchitis*—Episodes of acute bronchitis with cough, sputum and breathlessness together with rhonchi; basal rales and expiratory wheeze may occur in older patients. The differentiation from attacks of left heart failure resulting from ischaemic heart disease is often difficult as both may co-exist.
3. *Spontaneous pneumothorax*—Severe pain in chest, shock Hyper-resonant note and shift of mediastinum.
4 *Acute pulmonary oedema*—Due to cause other than left ventricular failure. (See Chapter III).
5. *Pulmonary embolism*—Dyspnoea, precordial pain or hemoptysis. Signs of pulmonary artery dilatation and right ventricular failure. X-ray and E.C.G. evidence of infarction.

4. *Pulmonary emphysema*—Compensatory or localized type. Breath sounds accentuated. Signs of disease in lung, e.g., collapse or massive effusion.

5. *Obstructive emphysema* or emphysema due to ball valve type of obstruction of main bronchus—Mediastinum may be displaced to sound side. X-ray—Lung markings extend to periphery. On screening contrast in transparence of two lungs easily seen at end of expiration.

6. *Congenital large cyst*—May be difficult to distinguish clinically from pneumothorax. X-ray—No evidence of collapsed lung at hilum. Delicate trabeculations may be seen.

7. *Eventration of diaphragm*—No symptoms or symptoms referable to gastrointestinal or circulatory system or lungs. Heightened inspiratory ascent of costal margin on affected side due to lack of opposition of paralysed diaphragm. Screening—Diaphragm high in chest, paradoxical movement.

8. *Hernia of stomach or colon through diaphragm*—Same signs as eventration. Differentiated by barium meal. In herniation level of radio opaque mass visible on a higher plane than that of the oesophageal opening, in eventration the two levels coincide.

9. *Subphrenic abscess*—History of abdominal illness or operation. Fever. Alternating zones of resonance and dullness from above downwards. Fluoroscopy—raised and immobile diaphragm.

10. *Distension of stomach*—May cause left half of diaphragm elevated well above the nipple. Symptoms of dyspepsia. Normal chest expansion, bulging in left upper abdominal quadrant. Gurgling may be heard.

HYDROPNEUMOTHORAX—mostly tuberculous in origin. Diagnostic signs are—1. Shifting dullness—The upper limit of dullness is horizontal and shifts when patient's position is altered. 2. Succussion splash (Hippocratic succussion). 3. Tinkling sound may be heard particularly after coughing.

CHRONIC PNEUMOTHORAX—Pneumothorax persisting for more than 3 months. Causes—1. Failure of collapse of lung due to adhesions. 2. Air leak through congenital cyst. 3. Generalised emphysema causing multiple leaks.

**Treatment:** of pneumothorax—

A. Medical—

1. *No treatment*—if small pneumothorax as the air usually gets absorbed within a few days. The exception is the patient with severe lung disease who cannot tolerate even a

Ruptured aneurysm—Sudden catastrophe without warning, or after episodes of leakage.

INVESTIGATIONS:

1. *Plain radiograph of abdomen*—in lateral position often shows calcification in the wall of the aorta or in the thrombus included in the sac.
2. *Arteriography*—to determine size and extent of aneurysm.
3. *Ultrasonic scanning*—useful not only for confirming diagnosis but also for determining the changes in size of aneurysm during follow-up periods.

MANAGEMENT—Surgery is indicated for palpable, symptomless aneurysm, presence of pain or tenderness, leakage or rupture. Procedure of choice is resection of aneurysm and replacement with a prosthetic graft.

2 **Dissecting aneurysm**—Usually in males over 50.

*Symptoms and Signs*—(a) Pain—Sudden onset of severe tearing pain in chest, often radiating through to the back, abdomen and thighs. Spread into the upper limbs, hand and neck may also occur if the lumen of the carotid and subclavian arteries is involved, and coronary insufficiency or infarction may occur due to dissection extending into either coronary artery. (b) Shock and prostration may be severe. (c) Absence or diminution of peripheral pulses—Weak, unequal or absent pulsations in carotid, radial and femoral arteries. (d) Aortic incompetence developing for the first time is diagnostic (e) Hypertension in majority. (f) Death may occur from rupture into the pericardium.

*Investigations:*

*X-ray*—Progressive widening of aortic arch in serial films. Double outline of part of aortic arch suggestive.

*E.C G.*—may show ischaemic changes

*E S.R. and leucocyte count*—elevated.

*Management*—(a) Reduction of systolic B P. to 100-120 mm Hg. with reserpine 1-2 mg. IM every 4-6 hours, and Propranolol 1-2 mg every 4-6 hours Methyl dopa or Guanethedine can also be used. (b) Emergency surgery—Indications are—Uncontrollable AR, inability to bring B.P., pain or both under control within 4 hours, evidence of continued extension or enlargement of aneurysm, impending rupture or leaking of aneurysm, and aortographic evidence of acute saccular aneurysm.

3. **Aortic arch syndrome** (Middle aortic syndrome, pulseless disease, reversed coarctation, Takayasu's syndrome)

thorax. 5. Patients whose occupation poses special risks e.g. pilots, seamen.

METHODS—

1. *Chemical pleurodesis*—Recurrent pneumothorax can be treated by instillation of irritant substance into pleural cavity to induce pleurisy and subsequent pleural adhesions. Camphor in oil (10 ml. of 1% solution), or auto blood can be used, or iodised talc by thoracoscopy.
2. *Thoracoscopy and cauterization*—of the breach in the pleura, or excision of the bulla and oversewing of the defect.
3. *Pleurectomy*—if pneumothorax has recurred three times on same side despite repeated aspiration and chemical pleurodesis. Re-expansion of the lung then leads to obliteration of the pleural space.
4. *Decortication*—Stripping off of fibrin from affected visceral pleura.
5. *Segmental resection*—as a last resort.

## 22. PLEURISY

### Acute dry (fibrinous) pleurisy

**Causes:**

1. *Infection*—Tuberculosis, pneumonia, bronchiectasis, infection with Coxsackie B virus infection (epidemic pleurodynia or Bornholm disease).
2. *Infarction* of lung.
3. *Lung cancer.*
4. *Injury* to chest wall or disease of ribs.
5. *Rheumatoid arthritis.*

All pleural disorders with inflammatory exudation may start as fibrinous 'dry' pleurisy (See table).

**Symptoms:**

1. Pain in the side, sharp, stabbing or tearing, worse on coughing, deep respiration and pressure from outside. When the diaphragmatic pleura is affected the pain may be referred to the tip of the shoulder, or to upper abdomen from pleurisy affecting the lower lobes.
2. Rapid shallow breathing with unproductive cough.
3. Chilly sensations at onset and moderately intermittent fever.

**Signs:**

1. Diminished movement on affected side.

tion. The vertebral artery draws its blood supply from the opposite vertebral artery via their junction at the base of the basilar artery. This causes an interference with the flow of blood into the brain stem, and this is exaggerated by movements of the affected arm.

*Symptoms and Signs*—(a) Episodes of transient vertebro-basilar ischaemia triggered off by movements of the involved arm. (b) Diminished or absent pulse in the arm, and ischaemic and trophic changes may occur. (c) A murmur may be audible at the root of the neck.

*Investigation*—Arch arteriography may show occlusion of one or both subclavian arteries with retrograde flow in one or more vertebral arteries to the distal part of the subclavian artery.

*Management*—Endarterectomy and arterioplasty of innominate or subclavian arteries.

5. **Marfan's syndrome**—A hereditary disorder of connective tissue (abiotrophy) which affects both sexes and may be familial.

*Clinical features*—(i) *Skeletal stigmata*—Slender body build, abnormal height with disproportionately long bones especially fingers (arachnodactyly), high arched palate, lax, loose ligaments with hypotonic muscles, spinal deformities, and thoracic cage deformities such as depressed sternum and pectus excavatum. (ii) *Cardiovascular involvement*—Dilatation of aorta, dissecting aneurysm, aortic incompetence (iii) *Ocular abnormalities*—Dislocation of lens or myopia (iv) *Pulmonary disease*—Spontaneous pneumothorax, congenital cystic lung, congenital atelectasis.

## II. Peripheral arterial and venous disease

### PERIPHERAL ARTERIAL DISEASE

**Classification :**

1. Due to arterial obstruction—
   (a) *Degenerative disease of arteries*—Peripheral arteriosclerosis including arterial thrombosis (senile, diabetic) and embolism.
   (b) *Inflammatory diseases of arteries*—(i) Thromboangiitis obliterans. (ii) Infections—Subacute bacterial endocarditis, tuberculosis, syphilis, typhoid fever. (iii) Arteritis—Polyarteritis nodosa, giant cell arteritis, Takayasu's disease, rheumatoid disease.
2 Vasomotor—(a) Due to abnormal vasoconstriction—Raynaud's disease, acrocyanosis, ergotism. (b) Due to vasodilation—Erythromelalgia.

| *Nature of fluid* | *Causes* |
|---|---|
| *Prominence of eosinophils*: Pulmonary infarction and infection (bacterial and viral), amoebic liver abscess. Hodgkin's disease, hydatid disease, carcinoma, drug allergy, histoplasmosis, polyarteritis nodosa | erythematosus, rheumatoid arthritis, polyarteritis nodosa, scleroderma, (b) Viral—Infectious mononucleosis, influenza, psittacosis, Coxsackie virus (c) Fungal — Coccidioidomycosis, blastomycosis. 7. Drug allergies |
| *Multinucleated epithelioid cells*: May be been in effusions due to rheumatoid disease | |
| *LE cells*: May be seen in SLE | |
| 2. **Purulent effusion—** (*Empyema*) Character of pus: Pneumococcus: usually thick, greenish yellow with thick flakes of fibrin Streptococcus: Thin, turbid and greenish in colour. May thicken later | 1. Extension from lung infection — pneumonia, bronchiectasis, lung abscess, actinomycosis 2 Secondary to suppuration in adjacent structures—tuberculous necrotic mediastinal lymph nodes, ribs or paravertebral abscesses. 3. Penetrating wounds of chest. 4 Bronchopleural fistula. 5 Subphrenic abscess 6 Rupture of oesophagus 7. Spread by blood stream—pyemia or septicemia. |
| 3. **Haemorrhagic fluid—** (a) Blood tinged exudate | 1. Neoplastic implants on pleura. 2 Contusion of lung or chest wall. 3 Pulmonary infarction. 4 Tuberculosis 5. Primary mesothelioma of pleura. 6 Rupture of pleural adhesions. 7. Anticoagulant therapy. 8. Hemophilia 9 Pleuritis associated with amoebic liver abscess, benign pericarditis, or haemorrhagic pancreatitis |
| (b) Frank blood | 1. Trauma to thorax. 2 Haemorrhage from tumour implant 3 Spontaneous hemopneumothorax. |
| (c) Chocolate coloured fluid (degenerating red blood cells) | 1 Amoebic abscess of liver rupturing into pleural cavity. 2 Old cholesterol effusion. |
| 4. **Opalescent fluid—** (*Chylous or milky*) | |
| (a) Chylothorax — Pure chyle. Concentration of fat greater than 400 | 1 Trauma to thoracic duct. 2 Malignant growth or mediastinal glands outside the duct. |

2 Skin—Thin and atrophic.
3. Ulcer—Small ulcers on foot, or epidermophytosis between toes.
4. Hair—may disappear locally.
5. Nails—often reveal trophic disturbances. They may become discoloured or loosen from their bed. Digits tend to be tapering due to atrophy of subcutaneous tissue.

*Palpation*—

1. Temperature of skin—as judged by ulnar surface or palm of hand.
2. Sweating—More affected limb sweats more profusely.
3. Return of colour after blanching of a circumscribed area by pressure of finger. Normally it becomes perfused equally on two sides.
4. Arterial pulsation—Must be tested in all four extremities. In lower extremities femoral, popliteal, posterior tibial and dorsalis pedis. Occasionally pulsation in the last two vessels may be absent in normal individuals. If elevation of the leg to less than 45° causes the pulsation to vanish, existence of organic arterial disease in the lower extremity may be suspected.

*Auscultation*—over main arteries may reveal systolic bruit suggesting partial occlusion.

**General examination**—

1. *Blood pressure*—Measurement of ankle blood pressure before and after exercise provides most useful clinical information. Normally the ankle systolic pressure is equal to or higher than the systolic pressure in the arms. With arterial stenosis or occlusion, the ankle pressure is reduced depending on the extent of the disease. In normal individuals ankle pressure falls after exercise, and takes several minutes to return to the base-line level.
2 *Electrocardiogram*
3 *Fundus*—for retinopathy.
4. X-ray chest.
5. Blood sugar.
6. Full blood count.
7. ESR.
8. Urine analysis.
9. Blood urea.
10. Serum lipoproteins.

**Signs:** About 500 ml. of fluid is required to produce physical signs.

*Inspection*—

1. With large effusion, orthopnoea or preference for lying on same side.
2. Diminished mobility of chest on one side.
3. Bulging of intercostal spaces on affected side if large effusion in a thin person.
4. Fullness of hypochondrium if large effusion.
5. Apex beat may be displaced to opposite side.
6. Sternomastoid sign (Trail's sign)—Sternomastoid muscle on side of mediastinal displacement may be prominent.

*Palpation*—

1. Immobility of chest.
2. Displacement of trachea to opposite side.
3. Diminished or absent T.V.F.

*Percussion*—

1. Dull note (absolute dullness).
2. Increased resistance to percussion.
3. Dullness rising from the spine, highest in posterior axilla and falling again towards the sternum—Ellis's S shaped curve.
4. Skodaic resonance or boxy note just above the effusion.
5. Triangular area of dullness against the vertebral column at base of opposite lung (Grocco's triangle).
6. Obliteration of Traube's semilunar space if fluid on left side.

*Auscultation*—

1. Diminished or absent breath sounds.
2. Bronchial breathing in early stages because lung is compressed but bronchi are patent.
3. Diminished or absent vocal resonance.
4. Aegophony and whispering pectoriloqy just above the upper level of fluid.
5. No foreign sounds with large collection of fluid. Crepitations if small or moderate amount.
6. Rales may be heard at the base of the opposite lung due to congestion.
7. Heart sounds (and apex beat) may be obscured in case of large effusion on left side.

**Investigations:**

1. *X-ray*—Obliteration of costophrenic sinus on affected side with an opacity extending up the chest wall concave to-

**Differential Diagnosis:**

| | *Arteriosclerosis obliterans* | *T.A O* | *Raynaud's disease* |
|---|---|---|---|
| Sex .. | Mainly males (6 1) | Almost exclusively males | Mainly females (5:1) |
| Age of onset | Over 50 | 25-40 | Rarely after 40 |
| Localisation of lesions | Usually fingers, sometimes toes, usually bilateral | Lower extremities starting with toes Usually bilateral but asymmetrical | Usually bilateral in lower extremities |
| Intermittent claudication | Absent | Often | Often |
| Pain .. | Stiffness and tingling during attacks | Usually at night | Dull, in progressive cases also at rest |
| Arterial pulsation | Impaired or absent | Impaired or absent | Present |
| Colour . | In 3 phases: pallor, cyanosis and redness | Redness or cyanosis in progressive cases | In serious cases pallor or some reddish or bluish discolouration |
| Oedema ... | Absent | Often | Rare |
| Trophic changes | Small areas of local cutaneous gangrene on fingertips | Gangrene and ulceration usually in toes | Ulceration and gangrene occur frequently in progressing cases |
| Calcified arteries | Usually present | Usually absent | Absent |
| Superficial phlebitis | Absent | Often present | Absent |

**Treatment**—(of chronic peripheral ischaemic disease).

A. MEDICAL TREATMENT—Indications: (i) If intermittent claudication is the only symptom and it does not interfere with the patient's employment. (ii) Diabetes mellitus is not associated (iii) Presence of extensive disease contraindicates surgical interference. (iv) Failure of surgery to relieve symptoms

1. *Measures to prevent progress of the disease*—(i) Rest if presence of rest pain, wound or gangrene. (ii) No smoking. (iii) Reduction of obesity. (iv) Care of feet—skin

**Differential Diagnosis:**

I. **Conditions above the Diaphragm—**

| 1. *Thickened pleura* | 2. *Pleural effusion* |
|---|---|
| History of long standing. | History acute, of few weeks. |
| Interspaces depressed. | Interspaces bulging. |
| Dullness over base. | Flat note at base with skodaic resonance above level of fluid. |
| No change on change of posture. | Area of flat note changed by posture. |
| Diminished breath sounds. | Breath sounds often absent. |
| X-ray—Shadow not so dense or uniform. Upper level not well defined, no displacement of heart. | X-ray—Obliteration of costophrenic sinus. Moderately large effusion causes a uniform dense opacity with curved upper level, the concavity facing upwards with the highest point in the axilla. |

3. *Empyema*—Bulging of intercostal spaces, skin red and shiny with perhaps oedema of chest wall. Symptoms of sepsis. Leucocytosis.
4. *Hydrothorax*—Usually bilateral, if unilateral on right side. No pain in chest and no history of acute pleurisy. No fever. Evidence of cardiac, hepatic or renal disease. Transudate.
5. *Lobar pneumonia*—

| *Pneumonia* | *Pleural effusion* |
|---|---|
| Onset acute. | Onset rarely acute. |
| Rusty sputum. | Dry cough. |
| Prostration extreme. | Prostration moderate. |
| Impaired note. | Flat note. |
| No displacement of mediastinum. | Mediastinum may be displaced. |
| Outline of dullness irregular and limited. | Upper level of dullness extends from sternum to spine. |
| Bronchial breath sounds (absent if massive pneumonia). | Diminished or absent breath sounds. |

given three or four times a day. For hospitalized patients an effective vasodilating combination is 25-50 mg of Tolazoline in 1000 ml. of 5% glucose solution with 5% ethyl alcohol given slowly (6 hours) by IV infusion. (v) *Natural Prostaglandin* (Prostacyclin)—by infusion prevents platelet thrombi forming in arterial walls.

(f) *Platelet anti-aggregating agents*—e.g. Dipyridamole (Persantin) 50-100 mg. t.d.s.

(g) *Thrombolytic therapy*—reserved for acute ischaemia.

3. *Relief of pain due to ischaemia*—Analgesics. Vitamin $B_{12}$ of value in diabetic and other peripheral neuropathies associated with vascular disease.
4. *Muscle depressants*—Night cramps of various origin such as radiculitis, ischaemia and venous congestion are relieved by depressant drugs—Quinidine 0.2 gm. together with Diphenhydramine (Benadryl) 50 mg. at bedtime.
5. *Steroids*—Anti-inflammatory effect useful for treatment of polyarteritis nodosa, lupus erythematosus and scleroderma.
6. *Hyperbaric oxygen*—Useful in acute traumatic arterial occlusive disease when the limb is being preserved before or immediately after surgery, and in tiding patient over acute exacerbation in Buerger's disease.
7. *Anticoagulants*—in Raynaud's syndrome if symptoms are unrelieved by vasodilators.
8. *Management of ulceration and gangrene*—(a) To eradicate infection, the hand or foot is soaked in saturated solution of boric acid, three times daily or 1 : 10,000 potassium permanganate solution Appropriate antibiotics systemically. (b) If necrotic crust over ulcer, wet dressings of streptokinase and streptodornase in 20 ml. of physiological saline solution. (c) Refrigeration—when amputation is inevitable but the general condition of the patient makes surgery hazardous, valuable time can be gained, pain relieved and absorption of toxin stopped by packing the extremity in ice. This can be carried on for several days while the patient is prepared for amputation.

B. SURGICAL TREATMENT—Indications—(i) Evidence of advanced ischaemia (rest pain, gangrene). (ii) Diabetes mellitus (iii) Rapid or sudden progress of the disease. (iv) If leg pain during exercise interferes with patient's employment.

A bypass graft is performed if the arteriogram shows a reasonable lumen at the site of the proposed anastomosis and atleast

**Complications:** (1) Acute pulmonary tuberculosis or miliary tuberculosis. (2) Spread of disease to pericardium or peritoneum. (3) Pulmonary oedema. (4) Thrombosis of veins, e.g. superior or inferior véna cava or iliac or femoral veins. (5) Sudden death probably due to pulmonary embolism.

*Sequelae*—(1) Pulmonary tuberculosis within 5-6 years. (2) Permanent collapse of lung. (3) Pleural thickening, adhesions and bronchiectasis.

**Management:**

I. *General*—Rest in bed till fluid gets absorbed, nourishing diet, vitamins.

II. *Chemotherapy*—as soon as diagnosis seems certain in order to curtail the acute phase of the illness and to relieve discomfort. Antituberculous therapy for tuberculous effusion. For malignant effusion—After total aspiration, injection of 20 mg. mustine hydrochloride or 1 mg/kg body weight thiotepa.

III. *Management of the fluid itself*—Certain disadvantages may result from allowing the fluid to remain in the pleural cavity for any length of time—fibrin is deposited, the pleurae become thickened, re-expansion of the lung is hampered and the process may eventually lead to immobility of the thorax with loss of functional efficiency (frozen chest).

**Therapeutic thoracentesis:**

INDICATIONS FOR ASPIRATION OF FLUID ARE—

(1) Large effusion upto clavicle.
(2) Cardiac or respiratory embarrassment.
(3) Bilateral effusion.
(4) Acute pulmonary oedema.
(5) Secondary infection of effusion.
(6) Persistence of fever and constitutional symptoms.
(7) If effusion does not tend to get absorbed spontaneously even when anti-tuberculous treatment is being given.
(8) Fluid is haemorrhagic or has high content of protein.

TECHNIQUE—The patient sits up against a back-rest or leans forward resting the arms on the top of a bed-table. The skin is sterilized at the site of puncture which is usually the seventh or eigth intercostal space in the mid-axillary line. 2% procaine is used for local anaesthesia and it is injected right up to the parietal pleura. The aspiration needle is then introduced at right angles to the skin midway between two ribs and advanced into the chest till the penetration of the parietal pleura is indicated by a 'give in'. The needle is now attached to a 50 ml.

**Clinical stages—**

1. *Premonitory stage*—Often unnoticed by the patient. Characterised by attacks of recurrent phlebitis, swelling of feet, loss of hair on the legs and formation of tender nodules in skin. The stage may last from 2 to 7 years.
2. *Stage of claudication*—Severe cramping pains on walking which disappear after short rest and recur when the walk is resumed.
3. *Stage of rest pain*—Pain comes in paroxysms even at rest, is increased by elevation and relieved temporarily by lowering of the extremity.
4. *Stage of trophic changes and gangrene*—Pain constant and excruciating, vesicles on great toe followed by ulcers or fissures. Gangrene dry or moist spreading upwards.

*Clinical course*—Varies, may be very slow or stormy—(a) Only recurrent thrombophlebitis with no other symptoms (b) Intermittent claudication for years without exacerbation. (c) Fulminating type—First episode may lead to discolouration followed by gangrene in a few days.

**Management:**

1. *Conservative measures*—Protection of extremities from cold and damp conditions Giving up smoking. Vasodilator drugs may be tried in milder cases.
2. *Sympathectomy*—produces beneficial results by reducing vasomotor tone of peripheral vessels. Indications—Conservative treatment fails to control symptoms or in severe cases with nutritional skin changes. Results of operation for disease of lower limbs are more lasting than those of upper.

## Digital ischaemia

DEFINITIONS:

*Raynaud's syndrome*—The general syndrome of arterial insufficiency of the fingers, regardless of cause and presenting as episodic or continuous ischaemia, digital necrosis or gangrene.

*Raynaud's phenomenon*—Episodic digital asphyxia caused by arterial insufficiency.

*Raynaud's disease*—A disorder, seen principally in young, healthy women, who show episodic digital asphyxia due to an exaggerated reaction to cold in otherwise normal digital vessels.

CLASSIFICATION: of digital ischaemia—1. *Vasospastic ischaemia*—(i) *Abnormal reactivity*—Hereditary or idiopathic (Raynaud's disease). (ii) *Endocrine disorders*—Hypertension, pheochromocytoma. 2. *Organic ischaemia*—(i) *Arterial disease*—Atherosc-

with loss of respiratory function. Prednisolone 10 mg. b.d. or t.d.s. later reduced to 5 mg. together with chemotherapy. It should be given for at least 6 weeks after the fluid is absorbed to avoid recurrence. Corticosteroids may not be given in all cases but should be administered to patients with large effusions who are acutely ill, or if aspiration presents practical difficulties, or if loculation of fluid has occurred.

V. *Exercises*—to encourage expansion of the lower chest can be recommended quite early in the course of treatment.

## EMPYEMA

### Acute empyema

**Causes:** See table on p. 325.

**Symptoms:**

1. *Those of primary disease*—Imperfect recovery in pneumonic cases, or sudden increase in fever perhaps with rigors.
2. *Those due to mechanical effect*—Pleuritic chest pain in early stage, dyspnoea, cough and sputum.
3. *Those due to toxemia*—Malaise, anorexia, sweats and loss of weight. Finger clubbing may develop within 2-3 weeks of the onset.

**Signs:** (a) Same as effusion with sometimes oedema of chest wall. (b) Finger clubbing may develop within 2-3 weeks of the onset. Failure to aspirate may result in its presenting as an abscess of the chest wall commonly in relation to the costochondral junction of the 5th rib (empyema necessitas). (c) Bronchopleural fistula is suspected if increase in cough and sputum which may be bloodstained.

**Investigations:**

*X-ray*—Uniform opacity free in pleural space or localised by adhesions. Fluid level if bronchopleural fistula.

*Leucocyte count*—15,000–20,000 per c.mm.

*Culture of fluid*—for causative organism. Lack of bacterial growth suggests tuberculosis.

**Management:**

*Objectives of therapy*—Control of infection, evacuation of pus, obliteration of pleural space, re-expansion of lung, and restoration of normal pulmonary function.

1. *Aspiration*—Pus is usually thin and should be aspirated with syringe every second or third day. Continuous drain-

**Diagnosis:**

1. *Venography*—most useful for confirming diagnosis and establish the site.
2. *Radioactive fibrinogen-uptake test*—depends on preferential uptake of $^{131}$I- or $^{125}$I-labelled fibrinogen by forming thrombus. The test is more sensitive than venography in detecting a small thrombus in the muscular veins of the calf. Cannot be used for diagnosing thrombus in common femoral and pelvic veins. Contraindicated in pregnancy.
3. *Ultrasonography*—Simple and quick method of detecting complete occlusion of popliteal, femoral or iliac veins. May not detect small thrombi. Radionuclide venography is ideal for visualising iliac veins and inferior vena cava.
1. *Impedance plethysmography*—based on fluctuation of electrical impedance produced by changing blood volume of the limbs during inspiration and expiration This does not occur with extensive thrombosis

**Treatment:**

A **Of established thrombosis—**

1 *General measures*—(a) Complete bed rest until the process becomes quiescent (b) Elevation of the extremities to diminish oedema. No active or passive movement of the limb. (c) Avoidance of coughing, straining at stool and deep breathing. (d) Dehydration should be avoided.

2. *Specific drug therapy*—(a) Anticoagulants—Heparin—5000 units initial bolus injection with continuous infusion or subcutaneous, followed by maintenance dose of 30,000-40,000 units/24 hours for 7 days, combined with oral anticoagulants. (b) *Defibrinating drugs*—Ancrod, a purified fraction of Malayan pit viper. Loading dose of 1 unit/kg body weight in 250 ml normal saline, given in 6 hours, followed by a further dose in 15 minutes. Maintenance dose varies between 40-80 units every 6 hours. (c) *Fibrinolytic drugs*—Streptokinase—500,000 units given in 30 minutes followed by maintenance dose of 600,000 units every 6 hours.

   Contraindications to specific drug therapy—Any risk of haemorrhage such as peptic ulcer, malignant hypertension or haemorrhagic diathesis.

3. *Surgical treatment*—(a) Thrombectomy—if free-floating thrombus in ileo-femoral segment, or in the rare patient with gangrene caused by venous thrombosis. (b) Venous interruption—by proximal venous ligation if evidence of

**Adverse drug reactions in the lungs:**

(A) *Lung parenchyma*—

1. Diffuse pneumonitis—Methotraxate, procarbazine and azathioprine.
2. Diffuse pneumonitis with resultant fibrosis—Nitrofurantoin, cytotoxic drugs like melphalan, busulphan, cyclophosphamide, bleomycin.
3. Pneumonitis associated with drug-induced SLE
4. Pulmonary oxygen toxicity.
5. Intrapulmonary haemorrhage and haemoptysis due to thrombocytopenia from use of cytotoxic drugs, or anticoagulant drugs.
6. Pulmonary eosinophilia—Hypersensitivity reaction following use of sulphonamide, chlorpropamide, sulphasalazine, and imipramine.
7. Allergic alveolitis—Nasal insuffiation of pituitary snuff in diabetes insipidus.

(B) *Pulmonary vasculature*—

1. Pulmonary oedema—Heroin, methyldopa, hydrochlorothiazide, angiocardiographic contrast media, phenylbutazone, aspirin, nitrofurantoin, hydralazine, bleomycin.
2. Pulmonary hypertension—Aminorex fumarate.
3. Pulmonary emboli—High-oestrogen contraceptives, contrast media.

(C) *Airways*—Drugs causing brochial constriction—(1) Cholinergic drugs —carbacol, methacoline, pilocarpine. (2) Beta blockers. (3) Histamine liberators—Iodine-containing compounds, morphine, pentazocine, thiopentone, tubocurarine, suxamethonium. (4) Histamine mimicking drugs—betahistine. (5) Drugs acting as antigens—Antisera, penicillin, cephalosporin, demeclocycline. (6) Miscellaneous—Parenteral steroids, aspirin, synthetic prostaglandin inhibitors, anti-inflammatory agents, paracetamol.

(D) *Pleura and pleural space*—Pleurisy after methysergide, pleural fibrosis and effusion after practolol

(E) *Changes in sputum*—Reduction in bronchial secretions by belladona alkaloids and tricyclic antidepressants

(F) *Opportunistic infection in lungs*—Antimitotic agents, steroids, actinomycin C, drugs which cause aplastic anaemia

*Symptoms*—Fullness and flushing of face. Sometimes dyspnoea or dysphagia, occasionally convulsions.

*Signs*—Cyanosis and oedema of face, neck and arms. Dilated and tortuous superficial veins on thorax and upper abdomen. Prominent nonpulsating jugular veins. Inspiratory filling of neck veins and positive hepato-jugular reflux if obstruction is at or below entry of azygos vein into superior vena cava.

**2. Inferior vena caval syndrome:**

*Causes*—(i) *Extraluminal compression*—Ascites, abdominal tumours, tuberculous plastic peritonitis. (ii) *Intraluminal*—Carcinoma of kidney invading IVC, or thrombosis extending from pelvic veins.

*Symptoms and Signs*—Cyanosis and oedema of legs with dilated varicose veins on legs and often abdominal wall. Dilated collateral veins on abdomen and chest with reversal of flow of blood in veins of lower abdominal wall (normally from above downwards). Ulcer due to stasis may develop on the leg in chronic cases.

*Rate of onset*—Rapid onset over days, or one or two weeks suggests acute bleeding, acute leukaemia or hemolysis.

*Drug ingestion*—Detailed questioning about taking of drugs such as salicylates, and exposure to radiation.

*Occupation*—Exposure to toxic chemicals at work.

*Diet*—History suggesting dietary deficiency.

*Family history*—of anaemia or jaundice common in congenital hemolytic anaemia. Occasionally family history in pernicious anaemia.

*Bleeding*—Blood loss commonest cause of anaemia—hematemesis, melena, bleeding piles, menorrhagia, hematuria, hemoptysis.

*Gastrointestinal system*—Symptoms suggestive of peptic ulcer, cirrhosis, neoplasm, hiatus hernia. Diarrhoea often intermittent and glossitis common in megaloblastic anaemias.

*Reproductive system*—Menorrhagia. Number and interval between pregnancies.

*Urinary system*—Symptoms of renal insufficiency such as nocturnal polyuria.

*Nervous system*—Paresthesia in hands and feet in deficiency anaemias.

*Bleeding tendency*—as suggested by easy bruising or skin petechiae, prolonged bleeding after trivial injuries, or bleeding from more than one site.

*Skeletal system*—Bone pains may occur in anaemias due to marrow infiltration or replacement as in multiple myeloma, leukaemia, malignant lymphomas and myelosclerosis.

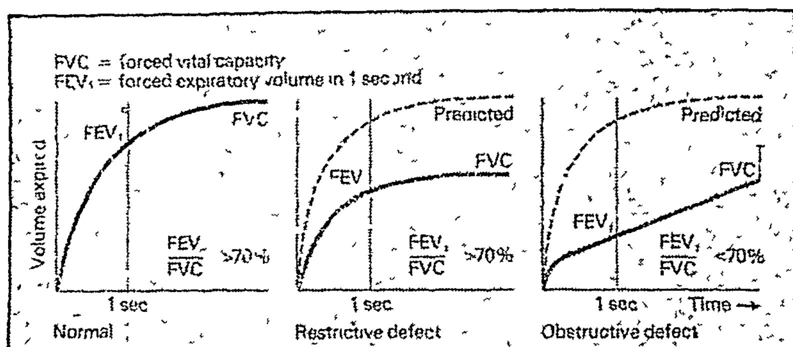
**II. Physical examination—**

*Skin*—Colour of skin, petechiae and ecchymoses. In pernicious anaemia the skin may have a lemon yellow tint, and in acute leukaemia an ashen tint. In myxoedema coarse and dry. Petechiae in anaemia suggest diagnosis of aplastic anaemia or leukaemia.

*Nails*—Brittleness and longitudinal ridging common in chronic iron deficiency anaemia, occasionally koilonychia

*Conjunctivae*—show pallor due to anaemia. Icterus rare, when present suggests hemolytic anaemia or hepatic disease. Mild icterus may be seen in pernicious anaemia

*Mouth*—(i) Mucous membrane—Petechiae on palate, cheeks, or tongue in aplastic anaemia and leukaemia. (ii) Gums—Hypertrophy in leukaemia especially monocytic (iii) Tongue—Acute glossitis, or smooth tongue common in megaloblastic anaemia, occasionally in iron deficiency anaemia. (iv) Pharynx




Spirometric tests Interpretation of results

II **Respiratory gas exchange:** Blood gas tension measurements can give information about two important facts—(i) Overall ventilation (ii) Efficiency of gas exchange

1 **Estimation of blood $CO_2$ tension—**

$PaCO_2$ is an index of overall ventilation with a normal range of 5.0–6.0 kPa (37-45 mm Hg).

*Method*—The patient breathes in and out of a small rubber bag which is filled with about 1.5 1 of oxygen at the start. After 90 seconds the contents of the bag have come into equilibrium with the alveolar air and this in turn has reached equilibrium with the venous blood arriving in the pulmonary capillaries. The fractional concentration of $CO_2$ in the bag is measured.

2 **Gas exchange—**

Gas exchange is reflected in the tension difference between the alveolar $PO_2$ and the arterial $PO_2$ known as the alveolar arterial tension gradient ($A\text{-}aDO_2$).

*Interpretation*—$A\text{-}aDO_2$ values of 3 5 kPa (26 mm Hg) or less are within normal limits, higher values signify abnormal gas exchange.

3 **Transfer factor (TCO)—**

It is another approach to assessing overall gas exchange process which it expresses as the quantity of gas transferred in a given time as a result of a measured average tension gradient from alveoli to pulmonary capillary blood.

*Method*—Usually carbon monoxide (CO) transfer is measured by the single breath technique. Gas containing a known concentration of CO (0.2-0 3%) is inhaled. The breath is held for

should be given alone. (c) The hematinic should be given in adequate doses for a sufficient period of time.

## Iron deficiency anaemias

**Causes:**

**1. Increased physiological requirement—**

(a) *Growth*—Iron deficiency anaemia is more common in children between ages of 6 months and 2 years, and from 11 to 16 years due to spurts of growth during these periods. (b) *Menstruation*—Anaemia common in adult menstruating females. (c) *Pregnancy*—During pregnancy anaemia is almost universal.

**2. Pathological blood loss—**

(a) *Menorrhagia.* Also ante-partum and post-partum bleeding. (b) *Gastrointestinal tract*—(i) Bleeding piles. (ii) Aspirin ingestion, also indomethacin, butazolidin and corticosteroids. (iii) Peptic ulcer. (iv) Intestinal infestations and infections —Ankylostomiasis, whipworm, chronic colitis due to amoebic or bacillary infection, giardiasis. (v) Miscellaneous—Cirrhosis of liver with bleeding oesophageal varices, hiatus hernia, diveticulosis of colon and intestinal polyposis, ulcerative diseases involving small or large bowel, e.g., tuberculous ulcers, Crohn's disease, ulcerative colitis. Telangiectatic lesions in G.I. tract. Malignancy of stomach, or colon. Hypersensitivity to cow's milk protein. Bleeding from gums if persisting for a long time. (c) *Urinary tract*—(i) Recurrent hematuria. (ii) Hemoglobinuria. (d) *Other causes*—(i) Regular blood donation. (ii) Injuries and accidents. (iii) Recurrent epistaxis. (iv) Recurrent hemoptysis. (v) Idiopathic pulmonary hemosiderosis. (vi) Hereditary haemorrhagic telangiectasis. (vii) In newborn due to fetomaternal haemorrhage or early ligation of umbilical cord.

**3. Nutritional defect—**

(a) *Low iron diet*—(i) Dietary habits: Iron deficiency anaemia is more common amongst vegetarians. Also consumption of foods like white bread, polished white rice, white sugar, etc. (ii) Poverty. (b) *Inhibitors in diet.*

**4. Poor absorption of iron—**

(a) Achlorhydria. (b) Gastrectomy, or gastrojejunostomy. (c) Coeliac syndrome (both in child and adult). (d) Geophagia.

**5 Excess iron loss—**

Without blood loss, iron loss may occur from exfoliation of iron containing epithelial cells, e.g., exfoliative dermatitis, after gastro-intestinal infection, gastritis, chronic mild intravascular

on the shape of flattened discs, such sputum indicates cavitation of any type. Mucopurulent sputum separates into three layers when collected in a conical glass.

(4) *Purulent*—Indicates infection somewhere in the respiratory tract. Large quantities of purulent sputum in bronchiectasis, lung abscess, chronic foetid bronchitis, pulmonary tuberculosis and gangrene of lung.

(5) *Colour of sputum*—(i) *Blackish*—due to inhalation of carbon in coal miners, copious black sputum (melanoptysis) may occur when there is breaking down of lung tissue. (ii) *Rusty (or Khaki)*—due to altered blood mixed with tenacious sputum in lobar pneumonia. (iii) *Small yellow sulphur granules*—in actinomycosis of lungs. (iv) *Reddish colour*—indicates presence of blood, fresh or altered, depending on the interval between the hemoptysis and production of the specimen. (v) *Frothy pink sputum*— in pulmonary oedema. (vi) *Creamy yellow sputum*—of staphylococcus infection. (vii) *Sticky brown-to-red sputum*—in Klebsiella (Friedlander's) infection. (viii) *"Currant jelly" sputum*—due to the presence n the sputum of blood tinged lung debris is likely to occur in influenza and bronchogenic carcinoma. (ix) *Dark brown purulent material*—like anchovy sauce in amoebic lung abscess and paragonimus (lung fluke) infection. (x) *Green colour*—(and musty odour) of sputum in pseudomonas infection. Purulent sputum if it has been stagnant as after overnight sleep, may be greenish owing to action of verdoperoxidase derived from neutrophils.

(6) *Other abnormalities*—

(a) *Discrete discs*—in a purulent sputum (nummular sputum) suggest cavitation.

(b) *Dittrich's plugs*—or small caseous masses, grayish yellow in colour and foul smelling in bronchiectasis.

(c) *Curschmann's spirals*—in asthmatic sputum may be seen by naked eye.

(d) *Fibrinous casts*—of smaller bronchi may be expectorated in fibrinous bronchitis as gray, white or reddish yellow particles.

(e) *Asbestos bodies*—due to exposure to dust.

(f) *Calcified bodies*—occasionally coughed up in pulmonary alveolar microlithiasis.

(g) *Hooklets*—of hydatid disease if cyst ruptures into bronchus.

deficiency of other haemopoietic factors, two populations of red cells—hypochromic microcytic and normochromic macrocytic may be seen side by side or the morphological changes may be much less severe compared to the degree of anaemia

2. *Red cell survival*—decreased.
3. *Serum iron*—Serum iron decreased. Total iron-binding capacity (TIBE) increased.
4. *Serum ferritin concentration*—Levels of 10 mcg/litre or less in simple iron deficiency anaemia
5. *Free erythrocyte protoporphyrin*—Elevated levels in circulating red cells.
6. *Bone marrow*—Increased cellularity from increased haemopoietic activity. Normoblasts smaller in size with scanty cytoplasm and with a ragged margin. Bone marrow iron —markedly decreased or absent.

II **To determine cause of iron deficiency anaemia**—

1. *Stool examination*—(a) Occult blood—Negative tests do not exclude intermittent bleeding or bleeding high up in the G.I. tract. (b) Bulky fatty stools indicate malabsorption. (c) Ankylostome, whip worm, amoebae.
2. *X-rays*—Barium meal and small bowel examination and barium enema may show a GI disorder X-ray chest
3. *Endoscopy*—Proctoscopy for detection of piles. Sigmoidoscopy and gastroduodenoscopy may reveal lesions not shown by X-rays.
4. *Jejunal biopsy*—if no source of blood loss is found, the coeliac syndrome should be excluded by biopsy.
5. *Cr-51 labelled red cells injection*—It may be necessary to assess Cr-51 loss in stools following the injection in order to detect GI blood loss which cannot be detected by other means.
6. *I.V. pyelography*—if hematuria
7. *Selective angiography*—if there is significant blood loss and yet no lesion has been detected, e.g., local angiomatous malformation which will be amenable to surgery.

**Differential Diagnosis:**

1. OTHER TYPES OF ANAEMIAS—

(a) *Rapidly developing anaemias*—e.g., leukaemia, hemolytic anaemia, aplastic anaemia No koilonychia. Other manifestations such as lymph node enlargement, purpuric rash, bone and joint pains and tenderness, hepatosplenomegaly or icterus.

5. Ulceration of larynx or trachea.
6. Trauma to chest wall with lung contusion.

**Uncommon causes—**

1. Haemorrhagic disorders—Purpura, leukemia, haemophilia, granulocytopenia, hereditary haemorrhagic telangiectasis.
2. Acute infectious fevers of haemorrhagic variety—smallpox, measles.
3. Benign tumours—Laryngeal and tracheal papilloma, haemangioma, fibroma, hamartoma.
4. Miscellaneous inflammatory disorders—Cystic fibrosis, pulmonary paragonomiasis, pulmonary abscess of amoebiasis.
5. Pulmonary vascular diseases—Pulmonary haemosiderosis, Goodpasteur's syndrome (episodes of haemoptysis with rapidly progressive glomerulonephritis), pulmonary A-V fistula, polyarteritis nodosa.
6. Pulmonary mycoses—Aspergillosis, blastomycosis, coccidioidomycosis, nocardiosis, histoplasmosis.
7. Thoracic hydatid.
8. Iatrogenic—(a) Diagnostic procedures—Bronchoscopy, biopsy of endobronchial tumours or inflammatory mass, percutaneous needle biopsy or transbronchoscopic lung biopsy, cuffed endobronchial tube. (b) Therapeutic—Anticoagulant drugs, radiation fibrosis.
9. Broncholithiasis.
10. Hypertension.
11. Idiopathic.
12. Cavernous haemangioma.
13. Polyarteritis nodosa.

DIFFERENTIATION FROM HAEMATEMESIS:

| *Haemoptysis* | *Haematemesis* |
|---|---|
| 1. Symptoms and signs of pulmonary or cardiac disease. | 1. Symptoms of gastric or abdominal disease. |
| 2. Blood coughed up. | 2. Blood vomited. |
| 3. Blood bright red, frothy and mixed with sputum. | 3. Coffee ground, mixed with food particles. |
| 4. Reaction alkaline. | 4. Reaction acid |
| 5. Sputum rusty next day. | 5. Stool tarry next day. |

**Investigation of Haemoptysis:**

HISTORY—(1) *Personal*—(a) Age—In childhood and adolescence. Pulmonary T.B., M.S., bronchiectasis main causes In

3. SUBACUTE BACTERIAL ENDOCARDITIS—Presence of fever, precordial murmur and palpable spleen might prompt a diagnosis of SBE. Illness of long duration, presence of a cause of iron deficiency, low grade fever and koilonychia would favour diagnosis of iron deficiency anaemia. Anaemia is never severe in SBE.
4. KIDNEY DISEASE—Here there may be slight oedema of feet and puffiness of face as in anaemia. Urine examination will clarify the diagnosis.
5. NEUROSIS—might be suggested because of tired feeling, aches and pains, headache, palpitations and paraesthesiae. Mild pallor may not be detected in such cases. Haemoglobin estimation and peripheral smear are necessary before diagnosing neurosis.
6. OESOPHAGEAL ACHALASIA OR MALIGNANCY—may be suspected when dysphagia is a predominant symptom Bairum studies of oesophagus will rule out these conditions and may show pharyngeal webs.
7. ENDOCRINE DISORDER—because of poor growth and sexual development in cases of iron deficiency since early childhood. Absence of other clinical features of hypopituitarism or hypothyroidism, and presence of pallor, splenomegaly and history of pica would help in correct diagnosis of iron deficiency anaemia.

## Treatment:

**A Eradication of the cause if possible—**

Treatment of ankylostomiasis, iron therapy from early stage of pregnancy, treatment of peptic ulcer, discontinuation of aspirin ingestion, iron therapy for patients who have undergone gastric surgery. Correction of menstrual blood loss, and treatment of any other bleeding lesion.

**B Iron therapy—**

I ORAL IRON THERAPY—

1. *Calculation of daily dose*—In an average case of moderately severe anaemia, haemoglobin rises by about 1 0 g per cent per week of iron therapy. If we consider blood volume to be 4500 ml. total Hb. regenerated in a week comes to 45 g or in a day 6.4 g. Since each gram of Hb. contains 3.4 mg of iron, to produce 6 4 g of Hb. iron required $= 6.4 \times 3.5$ mg., i.e., about 22 mg. In moderately severe anaemia iron absorption would be about 20%, therefore

8. *Scalene and mediastinal node biopsy*—indicated if clinical studies suggest that bronchial carcinoma may be the cause of haemoptysis.
9. *Needle aspiration biopsy*—if chest X-ray shows localised intrapulmonary lesion.
10. *Pulmonary angiography*—May show anomaly of vascular structure of lung, e.g. hemangioma, or distribution of aberrant vessels to pulmonary A-V fistula.
11. *Lung scan*—Useful in diagnosis of pulmonary infarction and lung carcinoma.
12. *Exploratory thoracotomy*—if investigations fail to reveal cause of bleeding and chest x-ray is normal, a diagnosis of idiopathic hemoptysis is justified. If x-ray lesion is present, exploratory thoracotomy is indicated.

**Management:**

1. *Sedation*—With phenobarbital or its equivalent. Pethidine or morphine is seldom necessary and a depression of the cough reflex is not desirable. Reassurance.
2. *Posture*—Bed rest with patient in semi-reclining position, and leaning on the elbow on affected side to minimise aspiration of blood and spread into unaffected bronchi.
3. *Blood transfusion*—If profuse bleeding.
4. *Antitussives*—If cough exhausting or troublesome, small repeated doses of codein or other cough suppressive.
5. *Antibiotics*—Useful in preventing secondary infection. Patients with active tuberculosis must be given antituberculous drugs if not already in use.
6. *Bronchoscopy or tracheostomy*—With frequent bronchial aspirations may occasionally be needed to prevent atelactasis.
7. *Selective embolization of bronchial arteries*—supplying the affected area in case of severe hemoptysis in bronchiectasis without resort to thoracotomy.
8. *Thoracotomy and surgical resection*—Of the affected part if bleeding persists despite all the above measures and life is threatened.

## 4. INFLAMMATION OF THE BRONCHIAL TREE

### Acute Bronchitis

**Definition**—Acute infection of mucous membrane of trachea and bronchi produced by viruses, bacteria or external irritants.

total requirement of iron at one sitting. A small test dose must be given IV before giving the total dose. Side effects—fever, joint pains, nausea, vomiting, diarrhoea, backache, bodyache, skin rashes, chest and abdominal pain, angioneurotic oedema and fall of B P. Anaphylactoid reaction may be fatal Local or generalised lymphadenopathy may occur.

(b) *Iron-sorbitol citrate* (Jectofer)—by IM injection Rapid absorption from injection site may cause saturation of iron-binding capacity, especially if patient is on oral iron or has associated folic acid deficiency Side effects—Flare up of urinary tract infection, fever, joint pains, nausea and vomiting.

3. *Calculation of total dose*—based on patient's body weight and haemoglobin level. If body weight is 'w' kg, blood volume is '70 w'. If Hb. level is 'h' g/100 ml. the Hb. deficit = (15-h) g/100 ml. Total Hb. deficit = $\frac{70w \times (15\text{-}h)}{100}$ g.

Now to form 1g of haemoglobin, 3.4 mg. of iron is required. Hence to make up total deficit of Hb., amount of iron required = $\frac{70w \times (15\text{-}h) \times 3.4 \text{ mg.}}{100}$ or 2 38w (15-h) mg.

Another 1000 mg. should be added to this for iron stores.

CAUSES OF REFRACTORY IRON DEFICIENCY—1. Failure to take iron. 2. Continued bleeding. 3. Associated infection or malignancy. 4. Inefficient preparation prescribed e g some slow release preparations. 5. Hypochromic anaemia not caused by iron deficiency. 6 Predominant deficiency of $B_{12}$ or folic acid. 7. Malabsorption of oral iron.

## Megaloblastic anaemias

**Causes:**

I. **Vitamin $B_{12}$ deficiency—**

1. *Inadequate intake*—(a) Strict vegetarians (vegans). (b) Extremely poor diet.
2. *Malabsorption*—(a) *Gastric*—Pernicious anaemia, congenital intrinsic factor deficiency, gastrectomy. (b) *Intestinal*—Intestinal stagnant loop syndrome (e.g. jejunal diverticulosis, anatomical blind-loop, ileo-colic fistula), chronic tropical sprue, ileal resection and Crohn's disease, selective malabsorption with proteinuria, fish tape-worm.

2. *Moist stage*—(i) Expectorant mixture:

| | | | | |
|---|---|---|---|---|
| Ammonium Chloride | | .. | .. | 0.3 gm. |
| Oxymel Scilla | .. | .. | .. | xx m. |
| Tinct. Ipecac | .. | .. | .. | x m. |
| Syrup Vasaka | .. | .. | .. | 1 dr. |
| Aqua .. | .. | .. | .. | ad 30 ml. t.d.s. |

(ii) Ephedrine 30 mg. or salbutamol 4 mg. if spasms severe, or IV aminophyllin if response is poor. (iii) Steroids—when symptoms are severe or asthma co-exists, prednisolone 40 mg on first day, dose reduced by 5 mg. a day.

3 *Convalescent stage*—Diet gradually increased. Patient may be allowed up in bed-room about 4 days after subsidence of cough and expectoration. Two to four weeks rest before resuming work. Change of air preferable. Breathing exercises.

## Chronic Bronchitis

**Definition**—A clinical disorder characterised by productive cough due to excessive mucus secretion in the bronchial tree which is not caused by local broncho-pulmonary disease, on most of the days for at least 3 months of the year for at least two consecutive years. Infection of the bronchi is usually present, the commonest infecting organisms being H. influenzae and pneumococcus. The bronchi are narrowed by thickened oedematous mucous membrane and viscus, infected mucus. As a rule the bronchioles are involved more than the larger bronchi hence the term 'obstructive airways disease' is preferable to chronic bronchitis.

**Types:**

1. *Simple chronic bronchitis*—Diagnosis based on patient's clinical history.
2. *Chronic obstructive bronchitis*—includes additional evidence of airway obstruction which is the characteristic ventilatory defect in chronic bronchitis and is particularly marked on expiration. It is caused by narrowing of airways by sputum, bronchospam and collapse during expiration particularly when this is forced.

**Causes:**

1. *Infection*—(a) Result of acute bronchitis. (b) Infective focus in upper respiratory tract, the nasal sinuses or tonsils. (c) Infective focus in lungs, e g., bronchiectasis, fibrosis, or tuberculosis.
2. *Smoking*—particularly of cigarettes.

6. *Miscellaneous features*—are less common. (a) Purpura and bleeding from mucous membrane or other sites because of thrombocytopenia, particularly with alcohol ingestion or antimetabolite drug therapy. (b) Mild malabsorption syndrome. (c) Sterility. (d) Widespread skin pigmentation.

**Laboratory diagnosis:**

1. BLOOD PICTURE—(a) Reduction of haemoglobin (Normal 14.0 g/decalitre). Reduced white cell and platelet count. (b) Mean corpuscular volume (Normal 85 femtolitres) raised to 95-100 femtolitres or more. This may be the first evidence of macrocytic anaemia. (c) Peripheral blood film—Presence of oval shaped macrocytes, poikilocytes, and usually hyper-pigmented neutrophils (which contain more than 5 nuclear lobes).
2. BONE MARROW—Hypercellular in severe cases, stippled erythroblasts. Also giant metamyelocytes and hyperseg-mented polymorphs. Megaloblastic changes may be difficult to detect if the anaemia is complicated by iron deficiency.
3. BIOCHEMICAL CHANGES—(a) Serum unconjugated bilirubin slightly raised. (b) Serum LDH markedly raised. (c) Serum iron raised. (d) Serum cholesterol low.
4. DEOXYURIDINE SUPPRESSION TEST—of labelled thymidine uptake. The test is abnormal if a significant degree of folate or $B_{12}$ deficiency is present. Correction of the test with the appropriate vitamin in vitro can be used to dis-tinguish which of the two deficiencies is present
5. TESTS FOR $B_{12}$ OR FOLATE DEFICIENCY—
   (a) *$B_{12}$ deficiency*—(i) Serum $B_{12}$—Usually very low. Normal range 160-925 ng/litre. (ii) Urine methyl-malonic acid excretion—after loading dose of valine. (iii) Therapeutic test—Haematological response to $B_{12}$ (1-2 mcg. of cyanocobalamin). (iv) Tests for cause of $B_{12}$ deficiency—Absorption of radioactive $B_{12}$ alone and with additional intrinsic factor (IF) e g., 24-hour urinary excretion test (Schilling test) or whole body absorption tests. Presence of antibodies to IF or parietal cells in serum, measurement of gastric acid and IF secretion after pentagastrin stimulation for diagnosis of pernicious anaemia.
   (b) *Folate deficiency*—(i) Serum folate—Normal 3-15 mg./ litre. Less accurate guide to folate stores. Normal or raised in uncomplicated $B_{12}$ deficiency. (ii) Red cell

| | *Pink puffer* | *Blue bloater* |
|---|---|---|
| *Clinical features* | | |
| Onset | Dyspnoea and cough | Cough without dyspnoea |
| Build | Thin | Obese |
| Sputum | Scanty | Profuse, mucopurulent |
| Dyspnoea | Intense with purse lip breathing | Relatively mild dyspnoea |
| Cardiac failure | Rarely develop oedema or overt heart failure | Often oedematous and easily lapse into CCF |
| Weight loss | Marked weight loss | No marked weight loss except terminally |
| Polycythemia | Uncommon | Common |
| *Course* | Unrelenting downhill | Ambulatory |
| *Investigations*: | | |
| X-ray chest | Narrow cardiac shadow. Attenuated vessels. Emphysema | Cardiac enlargement. Normal vessels. No emphysema |
| Arterial $PCO_2$ | Normal | Raised |
| Impairment of transfer factor (diffusing capacity) | Significant | Little or none |

**Management**—Principles :

1. To REMOVE THE CAUSE IF POSSIBLE—Air pollution, smoking.
2. To PREVENT ACUTE EXACERBATIONS—By avoiding overheated rooms, dampy and foggy places, stuffy clothing, over-feeding, smoking and too much alcohol. Long term treatment with tetracycline drugs or co-trimoxazole (septran), often produces striking improvement in patients who have a purulent sputum.
3. To TRY AND ARREST THE PROGRESS OF THE CHRONIC DISEASE BY—
   (a) *Increasing patient's power of resistance*—by giving to debilitated persons abundant butter, milk or cream, cheese and other fatty articles of diet. Weight reducing measures if obesity.
   (b) *Physical methods*—Regular exercises in fresh air and within limits of tolerance. Encouraging deep breathing and efficient clearance, coughing should follow a full inspiration. If economic condition permits, winter should be spent at warm resort.
4. To GIVE THE PATIENT AS MUCH COMFORT AS POSSIBLE—
   (a) *Antitussives*—such as linctus codein if dry cough.
   (b) *Mucolytics*—(i) Inhalation of medicated steam—Friar's balsam, menthol or eucalyptus. (ii) Use of aerosol—

anaemia, a regular check must be kept for carcinoma of stomach. Iron deficiency due to atrophic gastritis, and myxoedema are important complications in patients on adequate maintenance. For patients sensitive to $B_{12}$ injections or those who refuse injections oral $B_{12}$ (cyanocobalamin) in large daily doses (100 mcg or more).

2. FOLATE DEFICIENCY—(a) *Initial*—Folic acid 5 mg. daily by mouth for at least 4 months. Folic acid in such big doses should not be given until $B_{12}$ deficiency has been excluded, since folic acid may precipitate $B_{12}$ neuropathy in a severely deficient $B_{12}$ patient. (b) *Maintenance*—Need depends on whether the underlying cause can be reversed, e.g, gluten-free diet in coeliac disease.

3. THERAPY OTHER THAN $B_{12}$ OR FOLATE—(a) *Blood transfusion* of packed cells if circulatory collapse, severe angina or other manifestations of severe anoxia. (b) *Digitalis and diuretics* for cardiac failure. (c) *Treatment of infection* which usually precipitates megaloblastic anaemia. (d) *Iron therapy*—by mouth in patients who develop iron deficiency as shown by poor response to treatment, hypochromic cells in peripheral blood and low MCV. (e) *Packed platelets*—if patient presents with purpura or haemorrhage caused by thrombocytopenia. If not available Prednisolone 20-40 mg/day for few days. (f) *Treatment of gout*—may be necessary due to raised uric acid excretion because of increased purine breakdown

## Hemolytic anaemias

**Definition**—When the normal lifespan (120 days) of red blood cell is shortened to such a degree that the bone marrow is incapable of maintaining a normal red cell mass it leads to tissue anoxia. This results in increased output of erythropoietin stimulating production of red cells from the bone marrow. When the rate of destruction is in excess of eight times the normal, even a normal marrow cannot compensate and haemolytic anaemia results.

PATHOPHYSIOLOGY—Premature destruction of red cells can occur due to—(1) Abnormal structure and/or function of the membrane. (2) Exposure of cells to excessive physical trauma. (3) Unusual rigidity of cells as the result of precipitation or abnormal molecular configuration of haemoglobin.

tuberculosis, suppurative pneumonia with abscess formation. (iii) Allergic broncho-pulmonary aspergillosis.
2. *Congenital*—Kartagener's syndrome with situs inversus and sinusitis, fibrocystic disease, congenital (or acquired) hypogammaglobulinemia due to tendency to recurrent respiratory infection.

*Mechanism of development*—Bronchial obstruction results in collapse of the smaller bronchi, bronchioles and alveoli with resultant increased negative pressure. The bronchi are further weakened by supervening infection and are pulled open, whilst the alveoli undergo pneumonic consolidation and subsequent replacement by scar tissue.

**Symptoms**—Clinical types:
1. *Bronchitic*—Attacks of recurrent bronchitis, more common in winter Clubbing of fingers diagnostic.
2. *Haemorrhagic* (bronchiectasis sicca)—Recurrent haemoptysis with good health in between, or attacks of bronchitis.
3. *Suppurative*—Chronic cough, copious purulent expectoration general toxemia, clubbing of fingers varying from slight parrot beak curvature of finger nails to bulbous drum stick enlargement (pulmonary osteoarthropathy), dyspnoea and perhaps haemoptysis, weakness, loss of appetite, digestive disturbances, loss of weight, mild anaemia, The paranasal sinuses are frequently infected Retardation of growth may occur in children.
4. *With relatively rapid onset*—Symptoms developing with comparative suddenness, as a sequel to partial bronchial obstruction by a foreign body or after anaesthesia. In early stages paroxysmal cough with occasional offensive sputum which may be provoked by change of position. Later large amounts of foetid sputum.

**Signs**—The signs of bronchiectasis are mostly limited to auscultation and depend on the size of the affected bronchi, patency of the airways and viscosity of secretions. There may be signs of—(a) bronchitis, or (b) fibrosis, or (c) consolidation or (d) collapse, or (e) of cavitation.

*Early stages*—Signs of bronchitis—fine crepitations or sticky rhonchi and slight alteration in character of breath sounds.

*Late stages*—Bronchial breathing, coarse creps and perhaps signs of a cavity Changing character of physical signs after a long bout of cough when air entry may become louder and bronchial in character or from day to day. Sharp metallic or "leathery" rales characteristic. Localised flattening or retrac-

(ii) *Extravascular*—(a) Increased bilirubin production (jaundice). (b) Increased urinary urobilinogen. (c) Increased faecal urobilinogen. (d) Increased carbon monoxide production.

2. **Evidence of increased rate of red cell production**—

Due to compensatory bone marrow regeneration. (a) Reticulocytosis, normoblasts in peripheral blood. (b) Red cell polychromasia, 'skip cells' on blood film. (c) Erythroid hyperplasia of bone marrow. (d) Skeletal deformities due to marrow expansion such as thickening of vault of skull with 'hair on end' appearance, widening of marrow cavity and thinning of cortex in tubular bones of extremities.

3 **Evidence of decreased red cell production**—

Shortened chromium isotope half-life.

4. **Associated effects of a haemolytic state**—

(a) 'Work hypertrophy' of the spleen. (b) Increased folic acid requirements. (c) Increased uric acid production. (d) Sequestration of cells in spleen and reticuloendothelial system.

## Types of haemolytic anaemias:

### I. Congenital hemolytic anaemias—

**A. Enzyme deficiencies—**

1. G6PD DEFICIENCY—G6PD protects red cells against oxidant damage, e.g., from certain drugs. G6PD deficiency is a x-chromosome linked trait. *Clinical features*—(a) Drug-induced haemolytic anaemia, e g, sulphonamides, primaquine, nitrofurantoin and phenacetin. Ingestion of the drug is followed by fever, malaise, prostration and passage of dark urine. There is acute anaemia with reticulocytosis and many of the red cells contain Heinz bodies—single intracellular inclusions which stain with methyl violet. (b) Favism. (c) Neonatal jaundice. (d) Congenital non-spherocytic haemolytic anaemia. (e) Haemolysis during intercurrent acute illness. *Diagnosis*—established by enzyme essay.
2. PYRUVATE KINASE (PK) DEFICIENCY—usually presents early in life with haemolytic anaemia, jaundice and splenomegaly or sometimes with neonatal jaundice. Diagnosis can be confirmed by PK assay of red cells.

**B. Haemoglobinopathies—**

The haemoglobinopathies are a hereditary group of disorders in which there is either a defective production of normal

treatment of acute exacerbations of chronic infection and for pre-operative preparation. Ampicillin 500 mg. 6-hourly is the treatment of choice unless examination of sputum reveals organisms which call for alternative antibiotic. In patients with anaerobic organisms producing foul smelling sputum Penicillin 1 mega units IM b d. preferred. (b) *Continuous chemotherapy*—may be necessary in more severe cases during winter months or in patients with cystic fibrosis—Oxytetracycline 0.5 gm. b.d. or Cotrimoxazole. (Trimethoprim 80 mg. and Sulphamethoxazole 400 mg. per tablet) 2 tablets b.d.

3. *General supportive treatment*—(a) Adequate nutrition (b) Eradication of chronic nocturnal post-nasal discharge and treatment of sinusitis. (c) Avoidance of smoking.

B **Surgical:**

*Indications for surgical resection*—(1) Unilateral bronchiectasis with more than 1 ounce of sputum in 24 hours. (2) Evidence of extension of disease. (3) Repeated major infection in the bronchiectatic area. (4) Repeated attacks of pneumonia or of haemoptysis. (5) Deterioration of general health in spite of efficient medical treatment (6) Children (surgery is best undertaken at or shortly after puberty) or young adults who are good operative risks. *Contraindications*—(i) Old age. (ii) Poor cardiorespiratory reserves. (iii) Bilateral extensive disease.

## 5. BRONCHIAL ASTHMA

**Definition**—A syndrome characterised by increased responsiveness of trachea and bronchi to various stimuli and manifested by acute, recurrent or chronic attacks of widespread bronchial-bronchiolar narrowing, variable in severity and usually of brief duration.

**Classification:**

1. *Extrinsic asthma*—applies to those who produce excessive IgE on response to allergens (atopic).
2. *Intrinsic asthma*—refers to those cases in whom excessive IgE production cannot be demonstrated (non-atopic).

CONTRASTIVE FEATURES OF EXTRINSIC AND INTRINSIC ASTHMA:

| *Extrinsic asthma* | *Intrinsic asthma* |
|---|---|
| *Clinical features.* | |
| 1. Young patient—child or teenager. | 1 Adult patient over 35 or more |
| 2 History of eczema in childhood | 2 No history of eczema in childhood |
| 3 Family history of asthma, eczema or hay fever. | 3 Negative family history. |

deficiency or other causes. Mild to moderate splenomegaly in about one-third. $HbA_2$ elevated.

(b) *α-thalassemia*—Four varieties—(1) α-thalassemia 2 (silent carrier state). (2) α-thalassemia 1 (α-thal trait). (3) Haemoglobin H. disease—characterised by variable degree of anaemia with splenomegaly and typical thalassemic blood picture. Diagnosis confirmed by Hb electrophoresis which shows variable amounts of Hb H. *Management*—Symptomatic with blood transfusions, use of hematinics and judicious use of splenectomy and iron-chelating agents. (4) Haemoglobin Bart's hydrops foetalis—A common cause of stillbirths in some races.

C. **Disorders of red cell membrane—**

(1) *Hereditary spherocytosis*—Haemolytic anaemia associated with intermittent jaundice and splenomegaly. Complications include haemolytic or aplastic crises related to infection, gallstone formation, development of haemochromatosis, and chronic leg ulceration. Diagnosis—Many spherocytes on blood film. Increased red cell osmotic fragility. Treatment—Splenectomy.

(2) *Elliptocytosis*—Symptomless or may be associated with hemolytic anaemia and splenomegaly. Diagnosis by presence of variable proportion of elliptical or oval cells in peripheral blood. Treatment—Splenectomy is indicated in patients who have symptoms.

(3) *Acanthocytosis*—Red cells with spikes found in association with total absence of β lipoprotein. Presence of malabsorption, CNS involvement and retinitis pigmentosa.

(4) *Stomatocytosis*—Red cells with a staining pattern in which there is a gap in the middle of the cell (resembling a mouth).

II. **Acquired hemolytic anaemias:** (due to extracorpuscular defect).

A. **Immune hemolytic anaemias—**

1. *Hemolytic disease of the newborn.*
2. *Transfusion reaction.* (See blood transfusion).
3. *Autoimmune hemolytic disease.*

(i) *Warm antibody hemolytic anaemia*—Most patients have autoantibodies of the IgG class on their cells. About half the patients have underlying disease such as lymphoma, chronic lymphocytic leukaemia, collagen disorders e.g. SLE, or ovarian

(3) *Termination*—Spontaneously or as result of therapy. As bronchial spasm gets less, patient is able to cough a little and may bring out viscid muco-fibrin.

(4) *Duration of attack*—Varies from few minutes to several hours. Sometimes paroxysms are continuous—"status asthmaticus".

**Investigations:**

1. *Chest X-ray*—may be normal, or show radiographic signs of segmental or lobar collapse. Rarely mucoid impaction causes collapse and peripheral bronchiectatic changes. It may be useful in detecting episodes of asthmatic pulmonary eosinophilia.
2. *Sputum*—contains large number of eosinophils.
3. *Peripheral blood film*—shows eosinophilia.
4. *Assessment of severity*—(i) $FEV_1$, $FEV_1/FVC$ ratio and PEFR for measuring airway resistance. The effect of bronchodilator drugs should be assessed by making measurements before and after inhalation of a bronchodilator drug. (ii) Arterial blood gas analysis—Even slight increase of $PaCO_2$ indicates severe asthma.
5. *Skin tests*—may confirm allergens suggested by history.
6. *Provocation* (challenge) *tests*—Exercise challenge tests useful in young adults and can be used to confirm diagnosis of asthma, since fall in $FEV_1$ or PEFR occurs after 5-7 minutes of vigorous exercise in most patients with asthma.
7. *IgE and IgE specific test*—Elevation of total serum IgE supports diagnosis of atopy, and measurement of fractions, of IgE specific to one allergen radioallergosorbent test (RAST) can be useful in some patients in whom a specific allergy is suspected.

**Differential Diagnosis:**

1. *Other causes of paroxysmal dyspnoea* (page 232).
2. *Acute or chronic bronchitis*—complicated by spasmodic dyspnoea—Prolonged cough, worse with change in weather, more persistent dyspnoea, hyperresonance on percussion with suppressed breath sounds and inconstant musical and wheezing sounds.
3. *Pulmonary tuberculosis*—Particularly in aged may be associated with asthmatic dyspnoea Persistence of apical signs in between the attack. Tendency for low B.P. Positive sputum.

tortion of red cells caused by disease of small vessels. *Types*—(i) Haemolytic uremic syndrome—Acute haemolytic anaemia with renal failure in infancy and childhood. (ii) Malignant disease—Disseminated mucus-secreting carcinomas, particularly of stomach. (iii) Thrombotic thrombocytopenic purpura—Acute haemolytic disorder with neurological and renal manifestations. In addition there is generalised purpura and haemoglobinuria. (iv) Other disorders—DIC; collagen vascular disorders, toxaemia of pregnancy, septicemia, purpura fulminans and malignant hypertension.

(b) *Cardiac haemolytic anaemia*—Severe haemolytic anaemia may follow repair or replacement of aortic or mitral valve or teflon-patch repair of septal defects. Patient develops moderate to severe intravascular haemolysis with haemoglobinuria and haemosiderinuria. Iron deficiency may result from iron loss through the kidneys.

(c) *March haemoglobinuria*—A condition characterised by attacks of haemoglobinuria following strenuous physical exercise.

2. *Haemolytic anaemia resulting from infection*—
   (a) *Septicemia*—Haemolytic mechanisms vary. Treatment consists of control of underlying infection and blood transfusion.
   (b) *Parasitemia*—e.g., malaria plasmodia or Bartonella baciliformis.
   (c) *Other infections*—Leishmaniasis, cholera, toxoplasmosis. Occasionally viral infections such as mumps and infectious mononucleosis.

3. *Haemolytic anaemia due to chemicals and toxins*—
   (a) *Heavy metals*—Lead poisoning. (Lead also interferes with Hb. synthesis).
   (b) *Gases*—Inhalation of arsine gas (workers in metal-refining industries).
   (c) Sodium or potassium chlorate.
   (d) *Physical agents*—anaemia due to 100% oxygen inhalation in astronauts.
   (e) Insect stings and snake bite.

4. *Acquired defects of the red cell membrane*—
   (a) *Liver disease*—Red cell survival may be shortened in patients with infectious hepatitis, cirrhosis and biliary

5. *Sudden death*—from misuse of isoprenaline-containing aerosol inhalants.

## Management:

**Acute attack—**

1. *Bronchodilators*—

(a) *By mouth*—Single dose of—(i) Ephedrine 30 mg. (ii) Orciprenaline 20 mg. (iii) Salbutamol 2-4 mg. (iv) Terbutaline 5 mg (v) Metaproterenol 20 mg. (vi) Choline theophyllinate 200 mg.

(b) *By inhalation*—per puff—(i) Orciprenaline—0.75 mg. (ii) Salbutamol—0.1 mg. (iii) Rimiterol—0.5%. (iv) Ipratropium bromide—20-40 mcg. A major advantage of bronchodilator aerosol is that a decreasing therapeutic response is an early warning of the onset of severe asthma.

(c) *By injection*—if no response to above. (i) Adrenaline—0.3-0.5 ml. of 1 : 1000 solution subcutaneous drug of choice. (ii) Orciprenaline—0.3-0.5 mg. IM or subcut. (iii) Terbutaline—0.25 mg. subcut. (iv) Aminophylline—0.25 gm. IV slowly.

2. *Antibiotic therapy*—when active infection coexists.
3. *Corticosteroids*—if response slow. (a) Oral—8-day course of Prednisolone. 40 mg. in divided doses on first day, then dose reduced by 5 mg. per day. (b) Inhalation—Beclomethasone 400 mcg or Betamethasone 800 mcg a day have advantage of less side-effects. Prescribed as 2 puffs three or four times daily and started as a course of prednisolone is tapered off. Response to steroids is monitored by improvement in $FEV_1$ or PEFR.

**Status asthmaticus—**

Status asthmaticus is present if bronchodilators are ineffective in relieving the attack after 24 hours, or if the attack is so severe that the patient is unable to speak in sentences.

*Management*—

1. *Oxygen*—in high concentration continuously.
2. *Intravenous infusion*—should be set up to provide for administration of drugs.
3. *Fluids*—5% glucose saline about 100 ml/kg/24 hours.
4. *Electrolytes*—Potassium at a rate of 2mEq/100 ml of fluids especially when large doses of corticosteroids are given.
5. *Soda bicarb*—for correction of acidosis. 80-100 ml of 7.5% solution infused over 10 minutes.

*Psychoactive drugs*—Meprobamate, chlordiazepoxide. (x) *Diuretics*—Acetazolamide, chlorthiazide.

3 *Post-hepatitis aplastic anaemia*—Usually the hepatitis is negative for hepatitis B surface antigen (HB Ag-negative) and often clinically mild.

4. *Infections*—(i) Acute—e.g. infective hepatitis. (ii) Chronic infections—Bacterial endocarditis, miliary tuberculosis.

**Symptoms:**

Onset—Insidious, sometimes abrupt onset and course.

1. *Symptoms due to anaemia*—Weakness, fatiguability, lassitude, dyspnoea on exertion.
2. *Symptoms due to thrombocytopenia*—Haemorrhage into skin either as ecchymoses or petechiae, epistaxis, menorrhagia, bleeding from gums and alimentary tract. Rarely cerebral haemorrhage.
3. *Symptoms due to neutropenia*—Fatigue, sore throat, ulceration of mouth and pharynx, fever with chills, sweating. Chronic skin infection, recurrent chest infections.

*Abnormalities associated with Fanconi's anaemia*—Short stature, hyperpigmentation of skin, malformation of skeleton, microsomy, macrocephaly, malformation of kidneys, mental retardation, cryptorchism

**Diagnosis:**

1. *Peripheral blood*—shows pancytopenia. Neutrophils show 'toxic granulation' and increased alkaline phosphatase activity.
2. *Bone marrow*—Both aspirate and trephine biopsy, preferably from different sites. Hypocellular marrow, pancytopenia. Dry tap common. The reticulin is normal or reduced in aplastic anaemia and reticulin stains of trephine material may help to distinguish myeloproliferative disorders from aplasia. Bone marrow culture—Very few colonies when grown in agar medium but these are of normal quality.
3. *Isotope studies*—Ferrokinetic studies using radioactive iron. In aplastic anaemia there is poor clearance and turnover of iron, poor uptake by the bone marrow, low utilisation and no extramedullary hemopoiesis.

**Prognosis**—Poor prognostic features are—neutrophil count of less than 400/mm$^3$ combined with platelet count less than 20,000/mm$^3$.

**Treatment:**

1. PREVENTION AND TREATMENT OF INFECTION—(a) Isolation from other patients and scrupulous skin cleaning and mouth care.

vaccine if there is history of asthma starting directly after severe respiratory infection, expectoration of purulent sputum or evidence of lung damage. (ii) Non-specific desensitization—by giving a course of injections of certain substances like peptone, dust extract, etc.

(c) *Disodium cromoglycate*—Acts by stabilising the wall of the mast cell preventing release of intracellular mediators. It is administered by inhalation in powder form from a capsule. Dose—20 mg. 3 or 4 times a day by 'spininhaler', or nebuliser in young children. Trial should be given for atleast one month. Useful in mild recurrent or persistent asthma and in young patients with extrinsic asthma. If inhalation produces irritation with cough and wheezing, a compound preparation containing isoprenaline can be used.

(d) *Prophylactic therapy with steroid aerosol*—If cromoglycate fails, betamethasone dipropionate 100 mcg. or betamethasone 17-valerate 200 mcg. q d.s.

(e) *Psychotherapy*—may be useful in resolving psychological conflict.

2. **General measures—**

(a) *Oral bronchodilators.*

(b) *Antibiotics*—if infectious cause.

(c) *Chest exercises*—designed to abolish the state of over-distension of the lungs and increase the vital capacity are an effective form of treatment.

(d) *Antihistamine drugs*—of little value except in allergic asthma but may be tried for a few days and discontinued if there is no improvement.

(e) *Long term steroid therapy*—may be justifiable if other measures have failed in a chronic ambulant asthmatic, rarely free from respiratory difficulty and unable to work.

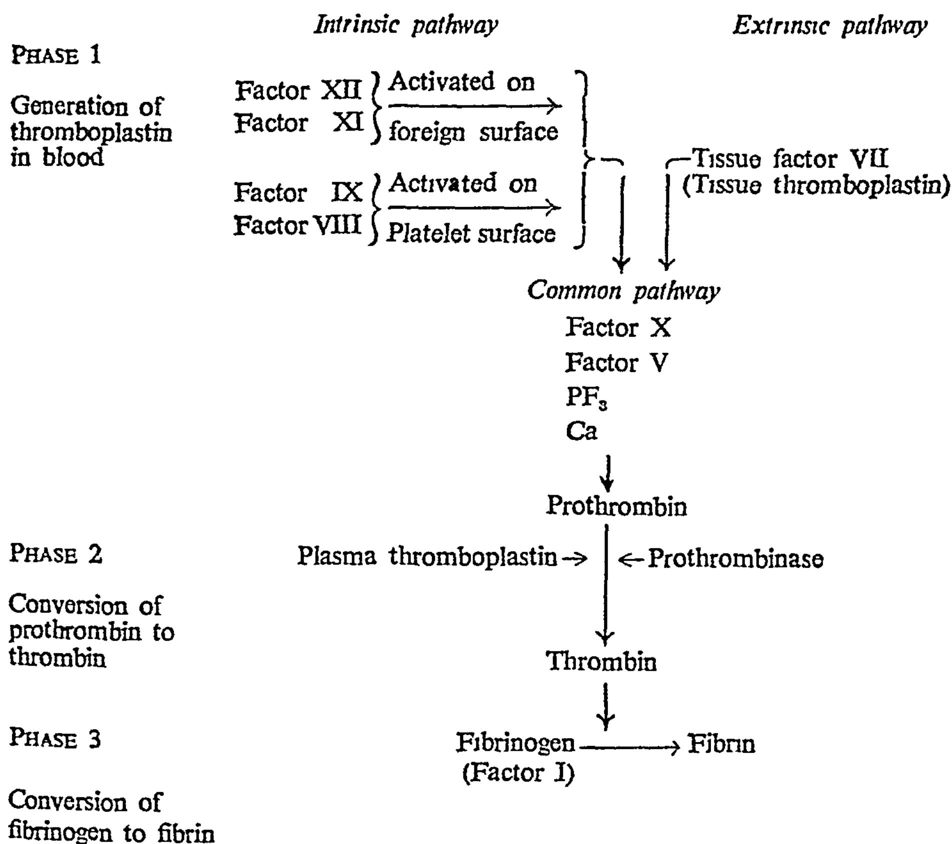
(f) *Avoidance of smoking*—and respiratory irritants such as fumes.

## 6. EMPHYSEMA

**Definition**—Emphysema is defined pathologically as an increase beyond normal in size of the air spaces distal to the terminal bronchioles, that is within the acinus, with destructive changes in their walls.

factor XII is first activated. The activated factor XII in turn activates another factor in blood called Plasma Thromboplastin Antecedent (PTA) to form an activation product. This activation product then reacts with factors V, VIII, IX and platelet factor 3 in the presence of calcium to form blood thromboplastin. (2) The thromboplastin then converts prothrombin to thrombin in the presence of calcium. (3) The thrombin finally converts fibrinogen to a fibrin clot.

*Extrinsic mechanism*—The tissues already contain an inactive thromboplastin (tissue thromboplastin) which is activated by factors VII, V and X in the presence of calcium (all present in shed blood). The active tissue thromboplastin so formed acts like its counterpart in the blood.



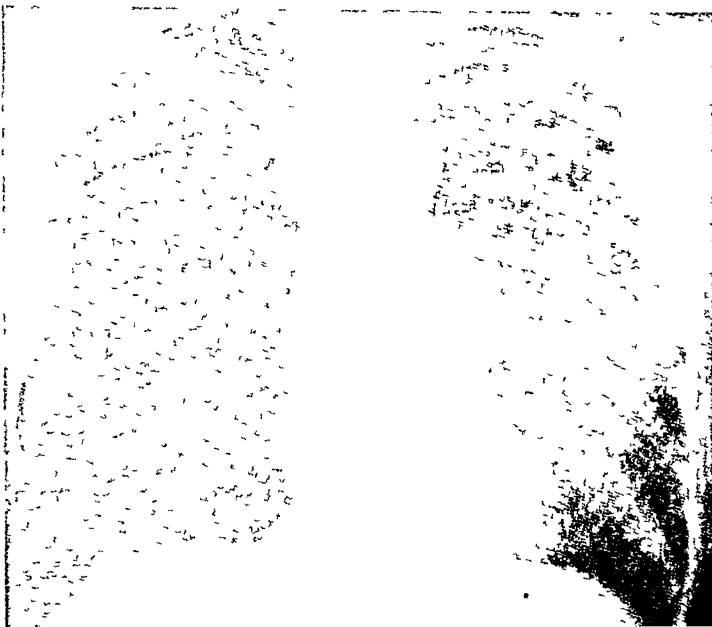

## Classification of haemorrhagic disorders:

I. **Defective coagulation**—

(A) CONGENITAL COAGULATION DISORDERS—(i) Hemophilia A and B and von Willebrand's disease. (ii) Other congenital coagulation factor deficiencies.



Hyperinflation of the chest Note the flattened and low diaphragm and the long, thin (tear drop) heart shadow The horizontal pattern of the ribs and the reduction in the distal vascular patterns indicate emphysema (For causes of hypertranslucency see Ch 14 19) Other causes of small cardiac shadow — 1 Malnutrition 2 Dehydration 3 Addison's disease



(b) *Reduced platelet survival*—(i) Chronic idiopathic thrombocytopenic purpura (ii) Drug or food sensitivity. (iii) Auto-immune hemolytic anemia. (iv) Acute infections. (v) Disseminated lupus erythematosus. (vi) Thrombotic thrombocytopenic purpura. (vii) Defibrination syndrome.

(c) *Increased splenic platelet pooling*—associated with splenomegaly.

2. *Qualitative platelet abnormality*—(i) Drugs—Aspirin, phenylbutazone, indomethacin, high doses penicillin. (ii) Functional defects in platelets—uremia, myeloproliferative diseases, hypergammaglobulinemia.

**III Vascular abnormalities—**

1. *Inherited*—Hereditary hemorrhagic telangiectasis.
2. *Acquired*—(a) Scurvy. (b) Anaphylactoid purpura—(i) Idiopathic (Henoch-Schonlein). (ii) Secondary to drugs, chemicals and infections (purpura fulminans). (iii) Purpura associated with hypertension, atherosclerosis, diabetes mellitus, and infections. (iv) Ehlers-Danlos syndrome.

**IV. Combined deficiency—**

1. Disseminated intravascular coagulation
2. Primary fibrinolysis associated most frequently with prostatic adenocarcinoma and cirrhosis of liver.

## Investigation of a case of Bleeding :

**History :**

(a) PRESENT HISTORY :

1. *Age and Sex*—Onset of bleeding symptoms in infancy or childhood and then persistence through life suggests inherited hemorrhagic disorder. Most patients with acquired hemostatic defect present in adult life. In a male most likely diagnosis is hemophilia or Christmas disease, in a female von Willebrand's disease.
2. *Type of bleeding*—(i) Petechiae—Vascular or platelet abnormality. (ii) Purpuric spots suggest capillary or platelet defect. (iii) Hematoma, hemarthrosis or large ecchymoses suggest hemophilia. (iv) Bleeding from superficial scratches and cuts usually stops in the normal time in hemophilia but is prolonged (lasting more than 15-30 minutes) in thrombocytopenia, von Willebrand's disease and in some patients with factor V de-



Miliary tuberculosis Such miliary mottling of lungs can also occur in pneumoconiosis, sarcoidosis, miliary carcinomatosis, extensive bilateral pneumonia, hemosiderosis, polyarteritis, lupus erythematosus, acute histoplasmosis, farmer's lung (Also see Ch 14 19)



Multiple pulmonary cannon ball metastases Note the raised right diaphragm A case of hepatocellular carcinoma Other sources of such metastases may be malignant renal and adrenal tumors, malignant testicular tumors, or prostatic carcinoma

Causes of cannon-ball shadows—

1. Carcinoma
2. Pyaemic abscesses
3. Multiple hydatid cysts
4. Histoplasmosis

4. *Abdomen*—Splenomegaly, hepatomegaly, abdominal masses.
5. *C.N.S.*—Peripheral nerves. Fundus for hemorrhages, papilloedema.
6. *Joints*—Swelling or partial ankylosis.
7. *Lymph node enlargement.*

**Clinical features**—of bleeding due to coagulation and platelet/capillary defects :

| *Clinical features* | *Coagulation defect* | *Platelet/capillary defect* |
|---|---|---|
| Bleeding from cuts and scratches | Uncommon, mild | Often profuse |
| Bruising | Often large | Usually small |
| Hemarthrosis | Common | Rare |
| Epistaxis | Not common | Common, often severe |
| G I bleeding | Uncommon | Common |
| Hematuria | Common | Not common |
| Post-operative bleeding | Usually 12-24 hours after surgery | Starts at time of surgery |
| Effect of pressure | Little or no effect | Controlled in most cases |

**Investigations:**

1. SCREENING TESTS FOR HAEMOSTASIS—
   (a) *Blood film*—may reveal presence of underlying cause of thrombocytopenia. It may give indication of platelet count and reveal presence of large platelets sometimes seen in thrombocytopenia.
   (b) *Platelet count*—(Normal 150,000-400,000/mm$^3$). Bleeding is common when platelet count is below 40,000/mm$^3$ and is usually severe if it is less than 10,000/mm$^3$. If spontaneous bleeding does occur when platelet count is above 40,000/mm$^3$, possibility of associated platelet function defect or coagulation defect should be considered.
   (c) *Bleeding time*—(Normal 1-3 minutes). Prolonged in thrombocytopenia or platelet function defects. Usually normal with vascular and coagulation disorders (except von Willebrand's disease).
   (d) *Other tests for platelet abnormalities*—If bleeding time is prolonged, further investigation of platelet



Interlobar effusion in horizontal fissure (arrows) in a case of heart failure. Fissural effusion may appear as round tumor and disappear with correction of failure (vanishing lung tumor). Note the large vessels to upper zones and small bilateral pleural effusions.



Pulmonary opacity at left lung base due to pulmonary arterio-venous fistula

## Hemophilia and related disorders

### Hemophilia

**Definition**—A hereditary disease affecting males but transmitted by females and characterised by prolonged coagulation and a life-long tendency to excessive hemorrhage. The term hemophilia A (true hemophilia) is used to describe the disorder when antihemophilic factor (Factor VIII) is deficient and hemophilia B when Christmas factor (CF) is deficient.

**Clinical features:** Habitual haemorrhage from various parts of the body, more persistent than severe. There is food correlation between severity of bleeding and degree of factor VIII deficiency.

1. *Subcutaneous and intramuscular*—At site of origin the tissue is indurated, raised and purplish black. Petechial hemorrhages very rare. Tendency to bruise easily.
2. *Mucous membrane and internal bleeding*—(i) Hematuria. (ii) Mouth, gums, lips and tongue. (iii) Epistaxis. (iv) Bleeding into brain or spinal cord. (v) Gastro-intestinal hemorrhage relatively uncommon.
3. *Joints* (hemarthrosis)—The most characteristic site of hemorrhage. Stages—(i) Acute stage with swelling of joint, warmth and pain. Knee joint most commonly involved. Fever. Acute attack may last a few days to a few weeks. (ii) Panarthritis—due to incomplete absorption of intra-articular blood. The joint remains swollen and painful for months or years. Repeated hemorrhages may occur. (iii) Stage of regression—Fibrous or bony ankylosis with atrophy and proliferation of bone.

**Von Willebrand's disease**—It is a congenital bleeding disorder which is thought to be inherited as autosomal dominant. The condition is characterised by prolonged skin bleeding, abnormal platelet function and reduced level of factor VIII coagulant, factor VIII protein and reduced level of plasma von Willebrand's factor. Hemorrhage is likely to occur following trauma, surgery or childbirth. Two main types of the disease are—(i) Classical von Willebrand's disease. (ii) Variant form which may have no family history, high incidence of consanguinity and unusual clinical severity.

**Management:**

1. LOCAL HEMOSTATIC AGENTS—where bleeding sites are accessible, local application of adrenaline, snake venom, thrombin, clauden, or fibrin foam, oxidized cellulose (oxycel) or gelatin by-products (gelfoam).

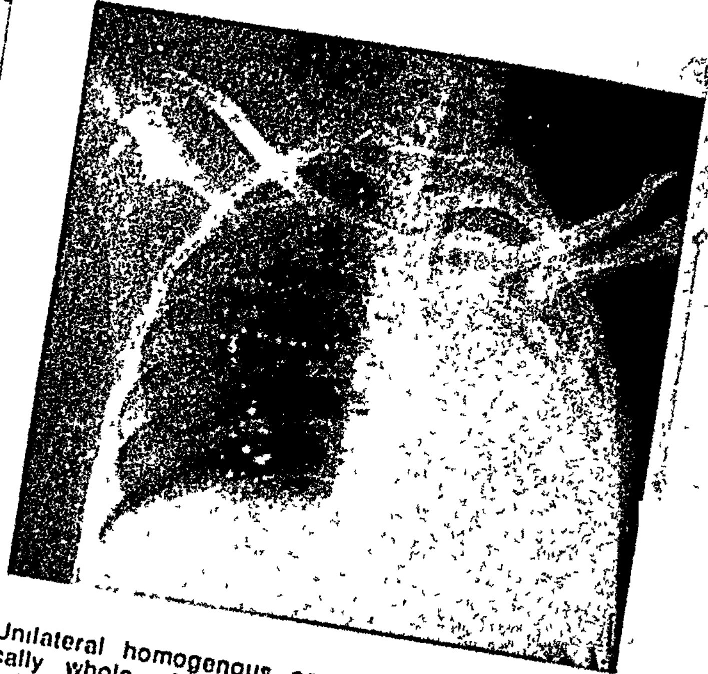
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Enlarged hilar and paratracheal lympnode [illegible] lymphadenopathy may be—

1 Primary tuberculosis
2 Sarcoidosis (as in this case)
3 Lymphomas (especially Hodgkin s)
4 Metastatic tumor especially carcinoma of bronchus

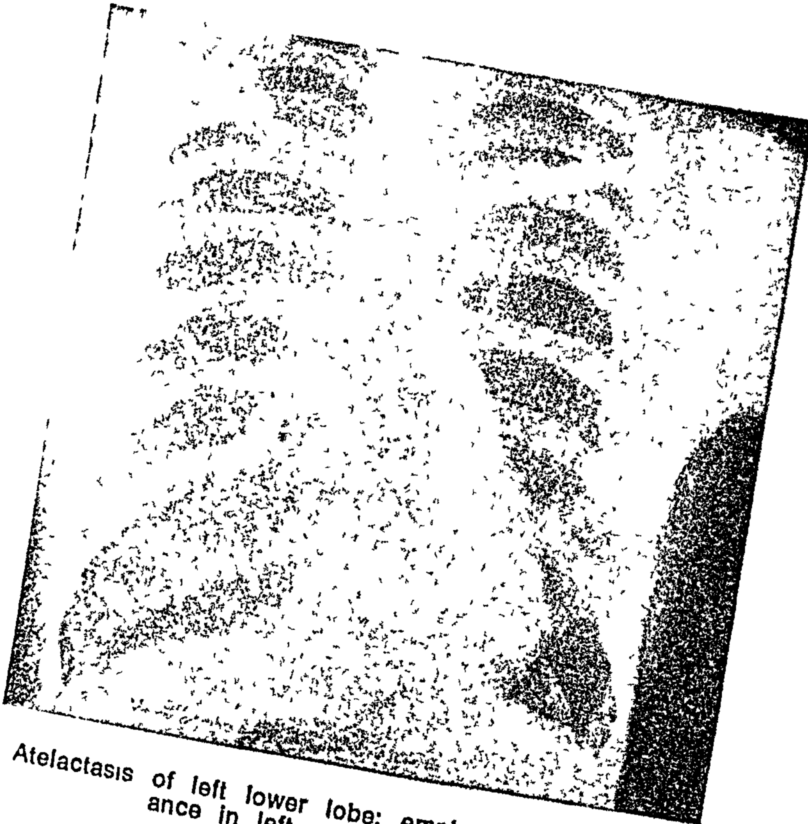
Causes of hilar shadows or prominent hilar regions—

1 Unilateral—(a) Aorta Descending on left, ascending on right (b) Thymus or middle medistinal tumors (may be bilateral) (c) Bilateral mucus filled bronchi (d) Pulmonary mass e g bronchial Ca superimposed on hilum
2 Bilateral—Lymphnodes or pulmonary arteries



Unilateral homogenous opacity obliterating practically whole of one lung field, due to massive collapse with medistinal shift to side of collapse. Other causes of unilateral homogenous shadow—.

1 Pleural effusion.
2 Consolidation
3 Fibrosis with pleural thickening.
4 Post-pneumonectomy



Atelactasis of left lower lobe; emphysematous appearance in left costophrenic sinus.

throughout the micro-circulation. In addition the equilibrium between production of clotting factors (including platelets) and their catabolism (during process of coagulation) is shifted which results in reduction in their coagulating levels. The result is a bleeding tendency which may be extremely severe. Thus in DIC there is the paradox of simultaneous thrombosis and hemorrhage.

**Conditions associated with DIC—**

1. *Infection*—Meningococcal, gram-negative infection, Staph. aureus, viral disease.
2. *Malignancy*—Carcinoma prostate, mucin secreting carcinoma, acute promyelocytic leukemia.
3. *Trauma and surgery.*
4. *Hepatic disease*—Cirrhosis, fulminant liver failure
5. *Obstetrical complications*—Abruptio placentae, amniotic fluid embolism, retained placenta, eclampsia.
6. *Immune response*—Anaphylaxis, incompatible blood transfusion.
7. *Miscellaneous*—Hypoxia, heat exhaustion, venoms.

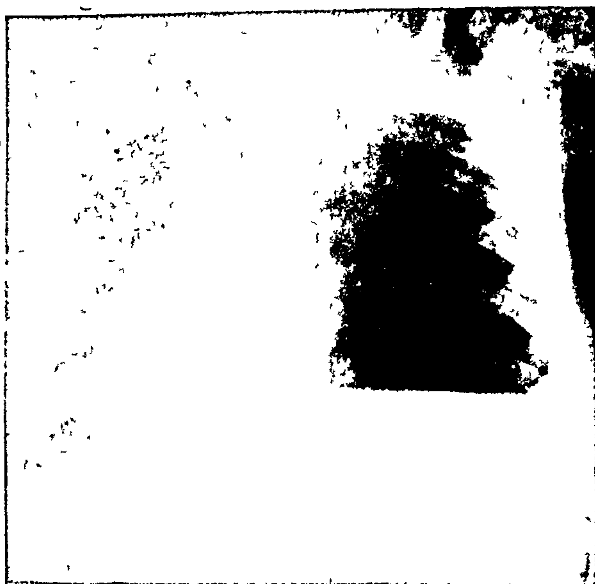
**Clinical features:**

1. *Hemorrhage*—In majority most commonly in the skin; varies from purpura to massive ecchymoses. Gastrointestinal hemorrhage may occur Oozing from puncture sites.
2. *Thrombosis*—Clinical thrombosis in about 1/4th of cases—thrombophlebitis spontaneous or following IV therapy. Peripheral gangrene or cyanosis of extremities. Major arterial or venous thrombosis uncommon.
3. *Other manifestations*—High incidence of cardio-respiratory failure, renal failure and jaundice.

**Laboratory diagnosis:** 1. Fibrin/fibrinogen degradation products increased. 2. Ethanol gelation/protamine precipitation. 3. Thrombin clotting time prolonged. 4 Platelet count reduced.

**Treatment:**

1. *General measures*—(a) Correction of primary condition. (b) Restoration of fluid balance. (c) Treatment of shock, acidosis and hypoxia.
2. *Specific therapy*—(a) Heparin indicated in deep vein thrombosis of lower limb, pulmonary embolism or peripheral gangrene. (b) Replacement of coagulant factors, platelets or fresh whole blood is required when hemorrha-



Fluid and air in the left pleural cavity (hydropneumothorax) with displacement of the heart to the opposite side



Left sided pleural effusion—A homogenous dense basal opacity with meniscus or curved upper margin, ill-defined upper limit which is higher laterally, filling of the costophrenic angle.

4. *Splenomegaly*—in 10%. Splenomegaly usually means that the thrombocytopenia is secondary to some other disease.

| | *Acute ITP* | *Chronic ITP* |
|---|---|---|
| Age | Children | Adults |
| Sex | Equal | More in females |
| Preceding infection | Common | Rare |
| Onset of bleeding | Abrupt | Insidious |
| Haemorrhagic bullae in mouth | May occur | Usually absent |
| Platelet count | $20 \times 10^9/l$ | $30\text{-}80 \times 10^9/l$ |
| Eosinophilia | Common | Uncommon |
| Duration | Few weeks | Months or years |
| Spontaneous remission | Majority | Uncommon, Fluctuating course |

LABORATORY DIAGNOSIS: See investigation of bleeding disorders.

**Treatment:**

1. CONSERVATIVE TREATMENT—
   (a) *Bleeding not severe*—wait and see policy especially in children and young women upto the age of 25, because spontaneous remission, often permanent occurs in number of patients.
   (b) *Severe bleeding*—(i) Blood transfusion. (ii) Prednisolone—40 mg. a day for 2 weeks. Sometimes permanent remission. Observe patient at intervals for next 12 months. If purpura disappears partially or completely but platelet count remains low 5-15 mg. of prednisolone daily for a further period of at least 3 months in the hope that permanent remission will occur.
2. SPLENECTOMY—Indications—(a) Chronic cases, particularly adults, who have not had sustained response to steroids, and in whom troublesome bleeding persists after 6 months. (b) Symptoms severe and platelet count very low. (c) Signs of incipient central nervous system hemorrhage. (d) Girls approaching age of onset of menstruation. (e) Young married women likely to become pregnant. (f) First 5 months of pregnancy.

4. Aplastic anemia.
5. Hodgkin's disease.
6. Aleukemic lymphatic leukemia.

**Clinical features:**

1. *Constitutional symptoms*—Sudden onset with rapid rise of temperature, chills, sweating, headache, muscle pains and severe prostration. In some cases there is a prodromal period of fatigue and weakness for one or two days. Nausea and vomiting may occur and sometimes jaundice. In acute fulminating cases continuous fever, coma and death.

2. *Infective lesions*—result from invasion of mucous membranes and skin by bacteria. Lesions in mouth most prominent—sore throat with reddening of mucous membrane progressing to necrosis with formation of yellowish or grayish black membranes which slough to produce ulceration. Also painful ulcers on gums, lips and buccal mucosa as well as throat and pharynx. Lymph nodes draining infective areas enlarge. Ulceration may occur in alimentary tract, vagina and nose.

BONE MARROW—Very few cells of myeloid series, increased number of lymphocytes and plasma cells.

**Treatment:**

1. *Recognition and removal of cause*—e.g. stopping of drug in drug-induced disease.
2. *Rest in bed and isolation.*
3. *Treatment or prevention of infection*—with broad spectrum bactericidal antibiotics like ampicillin or cephalexin. Marrow function usually returns within a week if patient can be protected from infection while leucocyte defences are low.
4. *Stimulation of leucopoiesis*—with corticosteroids. Prednisolone 40 mg. per day continued until neutrophil count is normal.
5. *Symptomatic treatment*—(i) Blood transfusion—Small amounts of fresh blood may be used as a supportive measure in severely ill patients. Granulocyte transfusion—is worth trying to cover the period preceding marrow recovery. (ii) Adequate fluids—IV if required. (iii) Toilet of mouth.
6. *Splenectomy*—if primary splenic neutropenia

**Clinical aspects:**

1. Generalised panacinar emphysema:

*Causes*—Usually no known cause. Some cases can be due to deficiency of alpha-1-antitrypsin, proteases liberated from circulating leucocytes causing progressive alveolar wall destruction.

*Symptoms and Signs*—Increasing breathlessness but no cough or sputum in absence of chronic bronchitis. On examination chest is barrel-shaped because of relative increase of antero-posterior diameter, and the percussion note is hyperresonant. Breath sounds, especially during expiration, are quiet.

*X-ray*—(1) Excess air in the lungs—Hypertranslucency of lung fields. Low flat diaphragms, increased retrosternal translucent area (2) Cardiovascular changes—Narrow vertical heart (tear drop heart) and large hilar vessels with diminution of peripheral vascular pattern. (3) Bullae—Rounded areas of hypertranslucency with thin, hair-line shadows forming the margin.

*Gas transfer measurement*—$PaO_2$ falls, but normal or low $PaCO_2$ (due to hyperventilation of areas of normal lung) until advanced emphysema, or complicating central airways obstruction.

*Complications*—(a) Respiratory failure. Heart failure rare. (b) Intercurrent infection. (c) Spontaneous pneumothorax.

*Management*: (a) Resection of bullae in otherwise normal lung. (b) Bronchodilator aerosols in patients who have some degree of reversible airway obstruction.

2. Atrophic (senile) emphysema—Old age, small chest, narrow intercostal spaces, resonant note, normal breath sounds. Stiff thoracic spine and later thoracic kyphosis.

3. Acute localised emphysema—One or more broncho-pulmonary segments are distended as the result of a valvular action due to an intrabronchial foreign body or tumour. It is rapidly reversible on restoration of the airway but may become permanent if sustained for some time. Fluoroscopy reveals it as a localized aerated area which does not deflate on expiration.

4. Compensatory emphysema—(Chronic localized emphysema)—Chronic overdistension of one lung due to disease of the other as in collapse or fibrosis. Mediastinal displacement common.

5. Acute interstitial (mediastinal) emphysema—Air leaks into the interstitial tissues of lung due to injury, or rupture of alveoli from cough or during labour. Surgical emphysema present On auscultation peculiar crunching and crackling sounds may be heard over the heart.

**Diagnosis:**

1. Raised hematocrit (usually 0.55) with associated leucocytosis and increased platelet count.
2. Leucocyte alkaline phosphatase (LAP)—raised.
3. ESR—very low (often below 1 mm in first hour) due to hyperviscosity.
4. Serum $B_{12}$ binding protein—increased.
5. Bone marrow—Hyperplasia of all marrow elements, particularly of red cell series.
6. Isotope studies—Increased red cell mass in presence of normal or increased plasma volume.

COURSE—Progression to myelofibrosis occurs in many patients, manifested by increasing splenomegaly with fall in hemoglobin. Bone marrow trephine shows increased fibrosis. Some progress to a clinical and hematological state difficult to distinguish from chronic myeloid leukemia.

**Differential Diagnosis:**

1. *Secondary polycythemia*—
   (a) *Hypoxic*—High altitude, congenital heart disease (left to right shunt), chronic pulmonary disease, gross obesity, methemoglobinemia.
   (b) *Tumors*—Renal tumors, polycystic kidneys, hydronephrosis; hepatoma, cerebellar hemangioblastoma, uterine myomas, bronchogenic carcinoma.
2. *Relative polycythemia*—(spurious polycythemia or polycythemia of stress)—Due to: (i) Stress—in anxious executives who drink and smoke in excess, are often hypertensive and on diuretic therapy. (ii) Dehydration secondary to water deprivation or vomiting. (iii) Plasma loss—burns, secondary to enteropathy.

**Management:**

1. *General measures*—Avoidance of strain. Low iron and low animal protein intake. No alcohol.
2. *Venesection*—To restore hematocrit to within normal limits treatment of choice If hematocrit is above 55 per cent, daily venesections of 500 ml. to reduce PCV below 52%. Useful adjunct to cytotoxic drug therapy which takes longer to control the high red cell mass. If hematocrit above 75 per cent, vigorous plasmapharesis—Bleeding the patient, centrifuging the blood, separating cells and reinfusing the plasma. Four to five units of blood (each unit

in winter. *Predisposing factors*—(a) Factors that lower resistance of the individual to infection—Old age, LVF, uncontrolled diabetes, corticosteroid therapy, hypogammaglobulinemia. (b) Viral infections of upper respiratory tract. (c) Chronic respiratory disease such as chronic bronchitis or asthma. (d) Impairment of bronchial drainage. (e) Aspiration of infected material. (f) Alcoholism.

**Symptoms:** Onset often sudden although sometimes it follows a minor respiratory infection of a few days duration.

1. *General symptoms of infection*—Malaise, fever, chills and rigors, vomiting; in the elderly confusion and disorientation.
2. *Pulmonary symptoms*—Dyspnoea, cough, and sputum which is often blood-stained or rusty and difficult to expectorate.
3. *Pleural symptoms*—Pain aggravated by cough, deep breath or movement, usually localised to site of inflammation.

**Signs:**

1. *General*—Patient appears ill with tachycardia, rapid respiratory rate, high fever, flushed dry skin and sometimes herpes labialis.
2. *Pulmonary*—(a) *Early signs*—Slight impairment of percussion note over the affected area, with weakness of breath sounds, or possibly harshness with prolonged expiration and fine rales on deep inspiration or after cough. (b) *Signs of consolidation*—on second or third day. Diminished movement of affected side of chest, increased vocal fremitus and impaired note over consolidated area, occasionally pleural friction rub, bronchial or absent breath sounds, no adventitious sounds or at times fine crepitant rales and increased vocal resonance. Voice conduction may be aegophonic. (c) *Resolution*—Most signs disappear by end of second week but fine rales and impairment of percussion note may be found longer.

**Investigations:**

1. *White cell count*—Polymorphonuclear leucocytosis. Persistence of leucocytosis suggests abscess formation or empyema.
2. *Sputum*—for organisms and sensitiveness to antibiotic therapy.
3. *X-ray*—Homogenous shadow involving all or part of one or more lobes.

*T-cell ALL*—The blasts like mature T-cells form E-rosettes with sheep erythrocytes. Blast T-cells show acid phosphatase reaction.

*B-cell ALL* (rare)—The blasts are morphologically distinct.

**Clinical features:**

*Onset:* Abrupt or insidious, abrupt onset common in children.

1. *Symptoms due to anemia*—Tiredness, weakness, fatigability, marked pallor.
2. *Hemorrhagic manifestations*—Skin petechiae, bruises, bleeding from gums and nose, or persistent bleeding after tooth extraction or tonsillectomy. Gastrointestinal, renal, and bleeding into nervous system may occur. Impairment of vision from hemorrhage in eye or vertigo from hemorrhage in ear.
3. *Infection*—(a) Infective lesions of mouth and throat—Ulceration of mouth and pharynx Gingival hypertrophy with necrosis and ulceration especially in acute monocytic leukemia. (b) Anal, rectal and vaginal ulceration may occur. (c) Herpes simplex infection of face. (d) Infections of respiratory tract such as bronchitis and pneumonia (e) Of skin namely cellulitis and multiple boils.
4. *Splenomegaly*—Slight to moderate enlargement.
5. *Lymphadenopathy*—especially in lymphatic leukemia.
6. *Organ infiltration*—(a) *CNS*—Meningeal leukemia with symptoms and signs of meningitis, intracerebral deposits or infiltration of cranial or peripheral nerves. (b) *Skin*—Bluish nodules or dusky red patches (c) *Kidneys*—leading to renal failure. (d) *Other sites*—testes, ovaries, liver, gut particularly stomach, and serous membranes such as pleura and peritoneum.
7. *Bone pain*—common; tenderness of sternum. Osteolytic bone lesions and pathological fractures may occur.
8. *Hepatomegaly*—frequent, may be associated with jaundice.
9. *Constitutional symptoms*—Fever, malaise, prostration.
10. *Fundus*—Petechiae may be seen.

**Diagnosis:**

*AML*—(1) *Total white cell count*—Over 500,000/c mm. unless aleukaemic leukaemia. (2) *Peripheral blood film*—Increased number of typical or atypical myeloblast, Auer rods may be found in the cytoplasm. (3) *Bone marrow*—More than 20% blast

'stuffed' with infected material. Cavitation in area of consolidation.

(c) *Klebsiella pneumonia*—(due to Friedlander's bacillus)—rare. Acute onset with severe prostration, viscid, blood-tinged sputum. Not sensitive to penicillin. High mortality. X-ray—Bulging of septum. Tendency for abscess formation. Sequelae common—bronchiectasis, lung abscess, cavitation, empyema.

(d) *Tuberculous*—Patient does not appear so ill. Failure to respond to sulphonamides or antibiotics. Positive sputum. X-ray—Multifocal apical consolidation especially with cavitation.

(e) *Viral pneumonias*—due to Eaton agent mycoplasma pneumoniae.

(f) *Aspiration pneumonias*—Insidious onset, physical signs rarely those of lobar consolidation, variable course. Sputum shows mixed normal flora.

(g) *Legionnaire's disease* (L. pneumophilia infection)—Severe pneumonia, unproductive cough, clouding of consciousness, diarrhoea White cell count normal or slightly elevated. X-ray—Lobar pneumonia or patchy bilateral consolidation. Antibody titre more than 1 256 diagnostic

| | *Bacterial pneumonia* | *Viral pneumonia* |
|---|---|---|
| Presenting symptoms | Respiratory symptoms predominant | Constitutional symptoms more prominent |
| Cough ... | Present at onset | Absent initially |
| Sputum . | Rusty | Mainly mucoid |
| Haemoptysis | Frequent | Less frequent |
| Pleuritic pain ... | May occur | Rare |
| Pulse rate .. | Rapid compared to fever | Relatively slow |
| Pulmonary signs | Rales and X-ray changes appear simultaneously | Few physical signs which do not correlate with X-ray changes |
| Degree of consolidation ... | Extensive | Less extensive |
| Pleural effusion .. | Common | Rare or minimal |
| Complications .. | Due to septicemia—prostration, peripheral circulatory failure | Due to high titre of circulating cold agglutinins — Meningism, haemolysis, peripheral venous thrombosis |
| Leucocyte count ... | High | Normal |
| Diagnostic test ... | Nil specific | Positive complement fixation in Q fever, psittacosis, ornithosis Cold agglutinins in serum in mycoplasma in 50% cases |

solone) at 2-3 week intervals according to tolerance for at least 2 years. *Immunotherapy*—because patient in complete remission (normal peripheral count, and less than 5% blast cells in otherwise normal marrow), reacts to his own leukaemic blast cells as though they were foreign tissue. Immunotherapy may be attempted with either nonspecific active immune stimulation with bacterial antigens such as BCG, or specific active immune stimulus using allogenic irradiated leukaemic cells. *Bone marrow transplantation*—could produce a cure

ACUTE LYMPHOBLASTIC LEUKAEMIA—1. *Induction of remission*—Vincristine (Oncovin) 1.4 mg/m$^2$ IV weekly with Prednisolone 40 mg/m$^2$ daily best initial combination, but a third drug colaspase (asparaginase), daunorubicin or doxorubicin given at this stage may improve duration of remission. Rapid lysis of leukaemic blast cells may cause hyperkalemia and uric acid nephropathy. Hence adequate hydration, alkalization of urine and allopurinol for 24 hours before start of chemotherapy. 2. *Eradication of leukaemia from CNS*—by cranial irradiation and intrathecal methotraxate. 3. *Maintenance therapy*—Methotraxate and 6-mercaptopurine for 2-3 years. Bone marrow and spinal fluid should be examined before stopping treatment and in boys bilateral testicular biopsy is advisable to rule out occult disease.

## Chronic Leukemias

### Chronic myeloid leukemia:

CLASSIFICATION:

Chronic granulocytic leukaemia (CGL)—commonest type
Atypical (Philadelphia chromosome negative CGL)
Juvenile chronic myeloid leukaemia
Chronic myelomonocytic leukaemia
Chronic neutrophilic leukaemia
Eosinophilic leukaemia.

### Clinical features:

1. *Non-specific*—Fever, loss of weight, malaise, excessive perspiration (due to increase in metabolic rate).
2. *Splenomegaly*—just palpable to enormous.
3. *Bleeding*—Excessive menstrual or other bleeding. Bruising or purpura may occur or spontaneous hematoma.
4. *Liver*—may be palpable.
5. *Symptoms and signs of anaemia.*

**Management:**

1. *Specific*—(a) Pneumococcal—Penicillin 1 mega unit of benzyl penicillin 6-hourly IM. Broad spectrum antibiotic like tetracycline if patient hypersensitive to penicillin, 500 mg. every 6 hours by mouth, or 100 mg. every 6 to 8 hours IM, or *Ampicillin* 250-500 mg. or Amoxycillin or Cephalexin 250-500 mg. 8 hourly. In severe pneumonias Cloxacillin or Methicillin 1 gm. immediately IV then 0 5 gm. 6-hourly. (b) Staphylococcal—Benzyl penicillin or Ampicillin plus Flucloxacillin. In patients sensitive to penicillin, Minocyclin or Lincomycin. (c) Klebsiella—Gentamicin or Chloramphenicol. (d) Pseudomonas—Gentamicin plus Carbenicillin IV. (e) Aspiration pneumonia—Benzyl penicillin and Metronidazole, and if patient seriously ill Cephamycin or Cefoxitin.
2. *General*—(i) Rest in bed and warmth—till temperature, pulse and respiratory rate have fallen to normal and all signs of pneumonia are gone. (ii) Diet—Mainly fluid or light diet.
3. *Symptomatic*—(i) Cough—Usually clears up with chemotherapy. Linctus codein if distressing cough. Excessive pulmonary secretions if not raised by coughing may be removed by catheter suction. For the critically ill patient tracheostomy should be considered before exhaustion and irreversible hypoxia supervene. (ii) Pleural pain—Application of warmth or counterirritants like antiphlogistine, liniments Analgesics (iii) Cyanosis and dyspnoea—Oxygen. (iv) Delirium—Chloral hydrate 1-2 gm., or barbiturates by mouth, or chloropromazine 50 mg. or diazepam 10 mg. I M. IV glucose and vitamins (v) Hyperpyrexia—tepid sponging. (vi) Dehydration—Intravenous fluids. (vii) Cardiac failure—Digitalis. Respiratory stimulant like nikethamide. (viii) Peripheral circulatory failure—Oxygen, and noradrenaline or other vasopressor drugs. IV hydrocortisone 200 mg. or dexamethasone 4 mg. should be given in addition in severe cases for 2 or 3 doses every 6 to 8 hours.

## 8. LUNG ABSCESS (Suppurative pneumonia)

**Definition**—Circumscribed suppurative inflammation of lung by pyogenic organisms leading to cavitation and necrosis.

**Causes:**

1. *Aspiration abscess*—Aspiration of infected material—(a) From upper respiratory tract—oral or pharyngeal sepsis,

4. *Transplantation*—the rare patient with identical twin may be treated by high dose chemotherapy and whole body irradiation followed by twin marrow transplantation in chronic phase. This can suppress the Philadelphia positive myeloid cells for years.

## Chronic lymphoid leukemia

**Classification:**

Chronic lymphocytic leukaemia (CLL).
Sezary leukaemia.
'Hairy' cell leukaemia.
Prolymphocytic leukaemia.
Chronic lymphosarcoma cell leukaemia.
Chronic lymphocytic leukaemia.

**Clinical features:**

1. *Onset—Age*: Rare in patients below 40 Sex: Twice more common in males. Often Insidious with fever, loss of weight, anorexia and symptoms of anaemia.
2. *Lymphadenopathy*—Enlarged nodes are non-tender and rubbery and may be symmetrically distributed.
3. *Haemorrhages*—from various sites due to thrombocytopenia.
4. *Hepato-splenomegaly*—in later phases of the disease.
5. *Infiltration of serous membranes*—results in pleural or pericardial effusion.
6. *Skin infiltration*—with nodules or diffuse erythematous infiltration (homme rouge).
7. *Infections*—due to suppression of immunoglobulins—bacterial pneumonia and herpes virus infections.

**Investigations:** Lymphocytosis in excess of $5\times10^9$/litre, higher counts not uncommon. Hypogammaglobulinemia in about 50%.

COURSE OF THE DISEASE—Variable progress. Most benign of all leukaemias, and in some disease remains static for years and may even regress. In others there is a steady increase in extent of lymphadenopathy and lymphocytic infiltration of other organs. Death is usually due to infection from combined effects of bone marrow failure and immunodeficiency.

**Treatment:**

1. *Chemotherapy*—(a) *Chlorambucil* (Leukeran) drug of choice—0.2 mg./kg. daily in divided doses after meals, or 6-10 mg. daily for 14 days followed by 14 days when no drug is given. It is important to have regular estimations

**Complications**—1 Haemoptysis. 2. Extension of inflammation to other parts of lung. 3. Cerebral abscess. 4. Rupture into pleural cavity.

**Differential Diagnosis:**

1. *Bronchiectasis*—History of cough influenced by posture and associated with copious sputum. Leathery rales and variable physical signs. No elastic tissue in sputum, X-ray characteristic.
2. *Cavitated bronchial carcinoma*—Elderly patient. Pain in chest, cough and dyspnoea and other pressure symptoms May be enlarged cervical or axillary lymph nodes. Cancer cells in sputum.
3. *Purulent bronchitis*—Long history. Widespread physical signs No elastic tissue in sputum.
4. *Caseating tuberculosis*—Signs usually apical Rapid wasting. Positive sputum.
5. *Interlobar empyema*—Signs generally more marked in axilla or near angle of scapula. Usually few signs. Diagnosis difficult without X-ray which will show an elliptical density in line of one of the fissures in lateral film; shadow with sharply outlined borders.
6. *Infected lung cyst*—particularly bronchogenic and hydatid, difficult to differentiate unless previous X-ray shows uninfected cyst or cysts in other parts of the lung. Radiologically there is a clear-cut spherical shadow with little or no surrounding pneumonitis
7. *Pulmonary infarction*—Postoperative or antecedent cardiovascular disease. Friction rub may be heard. Sputum may be blood stained. X-ray normal or wedge-shaped consolidation.
8. *Empyema with broncho-pleural fistula*—Fistula can be demonstrated by injecting 2 ml. of 1% methylene blue into the empyema and examining the sputum for the dye.
9. *Pulmonary haematoma*—History of chest trauma. Sputum not purulent and little cough Spontaneous cure.
10. *Pulmonary mycoses*—Cough, expectoration which may be offensive, dyspnoea. Fever and night sweats. Diagnosis by identification of the fungus in the sputum.
11. *Infected pulmonary bulla with fluid level*—Patient not so ill Less consolidation in surrounding lung.
12. *Cavitated pneumoconiosis* (Caplan's nodules)—Occupational history. Evidence of pneumoconiosis in the rest of lungs.
13. *Cystic fibrosis* (*mucoviscidosis*)—Symptom complex of (a) pancreatic insufficiency, (b) chronic bronchopulmonary

**Clinical features:**

I. *Local signs*—(a) *Lymphadenopathy*—Superficial lymph nodes in neck usually first to enlarge, at first one side, then the other. Sometimes axilla, groins, mediastinum or abdomen. Painless, leathery to feel and discrete. Characteristic appearance in advanced cases is a pyramidal swelling with its base at the clavicle and its apex at the angle of the jaw. (b) *Splenomegaly*—in two-third cases, usually of moderate degree, occasionally marked. (c) *Hepatomegaly*—in 50%, moderate, nontender enlargement of liver.

II. *Systemic symptoms*—

1. Cachexia and loss of weight.
2. Fever—(i) Mild grade remittent like tuberculosis most common or (ii) Undulant type of pyrexia of several days duration interrupted by periods of remission (Pel-Ebstein) or (iii) Continued type resembling typhoid.
3. Night sweats.
4. Infection—not uncommon. Herpes zoster, tuberculosis, or fungal disease.
5. Anaemia—may be due to haemolysis, hypersplenism, ineffective erythropoiesis, and hemodilution resulting from an expanded plasma volume.
6. Pain at site of disease after drinking alcohol.

III. *Due to metastatic growths or infiltrations*—

1. Skin—Pruritus, localised or generalised brownish eruption, erythema, herpes zoster, etc.
2. Bones—Localised pain and tenderness Sclerotic deposits on radiography (ivory vertebrae).
3. Nervous system—Paraesthesia and pains. Diplegia or paraplegia.
4. Mediastinal pressure—Dyspnoea, cyanosis and stridor, dysphagia.
5. Respiratory tract—Laryngeal paralysis, collapse of lung, pleural effusion and bronchiectasis.
6. Gastro-intestinal—Intestinal obstruction, jaundice and ascites. Sprue like condition due to obstruction of lacteals.
7. Genito-urinary—Hematuria, pyuria, retention of urine, pain in the back, a mass in the flanks or symptoms suggestive of disease of prostate or testis.

holism, heavy smoking, corticosteroid therapy, and certain occupations such as those leading to silicosis. (b) *Relation to other disease*—Not uncommon after influenza, whooping cough. More common with diabetes mellitus, cirrhosis of liver, pneumoconiosis, and following partial gastrectomy.

*Route of infection*—In majority infection acquired by inhalation of air-borne infected droplet nuclei derived from sputum of an adult with cavitary pulmonary tuberculosis.

**Clinical types:**

I **Primary pulmonary tuberculosis**—Primary tuberculosis refers to events following invasion by tubercle bacillus infection, being commonly caused by inhalation (rarely through skin or ingestion) of the bacilli into the lungs.

PRIMARY COMPLEX—Inhaled bacilli are deposited in the alveoli where a subpleural inflammatory lesion occurs. When they reach the regional lymphnodes, these also become infected. The tuberculin test becomes positive within 6 weeks of the infection These two components of the primary complex may resolve without complications and sometimes result in local calcification.

*Progress*—of primary complex may occur thus—

1. *Haematogenous dissemination*—about 3 months after primary infection (a) Acute type—Miliary tuberculosis, T.B. meningitis. (b) Chronic type—with local manifestations in kidneys, bones, joints, etc.
2. *Progress of lung component*—most commonly in adolescents and young adults usually about 6 months after initial infection. The lung focus extends, cavitates and pleural involvement leads to pleural effusion.
3. *Progress of lymphnode component*—It may cause pressure on trachea or main bronchi resulting in severe paroxysmal cough simulating whooping cough. There may also be dyspnoea, stridor or wheezing which may be mistaken for asthma.
4. *Bronchial involvement may cause*—(a) Partial bronchial obstruction with valve action causing obstructive emphysema (b) Complete bronchial obstruction may result in large areas of homogenous shadowing (formerly labelled epituberculosis). Bronchial involvement commonly involves middle lobes and upper lobes. Aspiration of infected material causes pneumonia or collapse Lesions may clear without sequelae but sometimes result in permanent collapse, bronchostenosis, bronchiectasis or obstructive emphysema.

pericarditis. (d) Nephritis if kidneys are included in the field. (e) Radiation malabsorption syndrome. (f) Radiation myelitis if excess dose is given to the spine.

2. CHEMOTHERAPY—for patients with disseminated disease (IIIB or IVA and IVB). Two regimes usually employed are:

**MOPP combination:**

| *Drug* | *Dosage* |
|---|---|
| Mustine hydrochloride (Nitrogen mustard) | 6 mg/metre² IV daily on days 1 and 8 |
| Vincristine (Oncovin) | 1.4 mg/metre² IV daily on days 1 and 8 |
| Procarbazine (Natulan) | 100 mg/metre² orally on days 1-14 inclusive |
| Prednisolone (given only with 1st and 4th courses) | 40 mg/metre² orally daily on days 1-14 inclusive |

Give 6 courses with 2 weeks' rest between the end of one course and beginning of next.

**MVPP combination:**

| *Drug* | *Dosage* |
|---|---|
| Mustine hydrochloride | 6 mg/metre² IV daily on days 1 and 8 |
| Vinblastine (Velbe) | 6 mg/metre² IV daily on days 1 and 8 |
| Procarbazine | 100 mg/metre² orally daily on days 1-14 inclusive |
| Prednisolone | 40 mg/metre² orally daily on days 1-14 inclusive |

4 weeks gap between courses.

3. SPLENECTOMY—Laparotomy with splenectomy is now done in many patients except those with Stage IV disease. Advantages are—(a) It can be determined whether spleen is involved or not. (b) Splenectomy also prevents recurrence at a site which is difficult to treat with radiotherapy because of its proximity to the left lung and kidney. (c) Increased accuracy of determining involvement of the liver and of lymph nodes not filled on lymphangiography. Disadvantage—Possible risk of increased morbidity and even mortality. Contraindicated in young children due to liability to overwhelming pneumococcal or H. influenzal infection.

(d) *Respiratory symptoms*—Dyspnoea and cyanosis out of proportion to signs in chest. Slight dry cough, scattered rhonchi and occasional creps.

(e) *Nervous symptoms*—Headache common, often severe. Signs of meningeal irritation in early stages.

(f) *Cardio-vascular symptoms*—Tachycardia.

(g) *Skin*—Miliary lesions of skin rarely present as macules, papules or purpuric lesions.

(h) *Fundus*—Choroidal tubercles pathognomonic, seen as single or multiple yellowish white spots which later become pigmented.

*Mantoux test*—Positive in majority.

*X-ray*—Scattered opacities throughout the lung fields—"snow storm appearance".

*Complications*—1. T.B. meningitis. 2. Pleural effusion or polyserositis. 3. Cervical lymphadenitis. 4. Hypokalemia 5. Blood dyscrasias—Anaemia with pancytopenia, at times leukemoid reaction, purpura.

**B. Chronic pulmonary tuberculosis:**

MODES OF PRESENTATION—

1. Symptom-free—Diagnosis on routine radiography.
2. Insidious—Malaise, undue fatigue, loss of weight, evening rise of temperature, and cough.
3. Persistent cough or "smoker's cough".
4 Unexplained loss of weight.
5. Pyrexia of unknown origin.
6. Catarrhal or influenzal—Repeated attacks of colds with run-down feeling, or failure to recover adequately from attack of influenza.
7. Haemoptysis—Sudden large haemoptysis due to erosion of an artery in a cavity, or more often recurrent haemoptysis of small quantity.
8. Pneumonia—not responding to usual antibiotics or showing only partial resolution.
9. Hoarseness of voice—due to laryngeal tuberculosis that occasionally complicates severe pulmonary infection.
10. Dyspepsia—Anorexia, indigestion, flatulence, constipation or diarrhoea.
11. Pleural—(a) Pleurisy dry or with effusion. (b) Spontaneous pneumothorax.
12. Traumatic—following injury to chest or "gassing".
13. Following certain diseases—such as measles, whooping cough, especially if complicated by bronchopneumonia.

2 *Other measures*—(a) Patient should drink 6 pints of fluid during the day. (b) Bicarbonate orally to patients with Bence Jones proteinuria. (c) Treatment of hypercalcemia. (d) Transfusion if severe anaemia (e) Analgesics for pain. (f) Plasmapheresis in patients who present with hyperviscosity.

## 8. BONE MARROW BIOPSY

**Indications:**

A. **For diagnosis:**

1. *High colour index anaemias*—(a) *Megaloblastic anaemias*—marrow shows typical megaloblastic red-cell formation with the presence of giant metamyelocytes. Such a picture occurs in pernicious anaemia, nutritional megaloblastic anaemia usually secondary to steatorrhoea, megaloblastic anaemia of pregnancy and megaloblastic anaemia due to anti-convulsant drugs. (b) *Hemolytic anaemia*—suggested by cellular normoblastic marrow. (c) *Aplastic anaemia*—few cells mostly lymphocytes, monocytes and plasma cells. (d) Myxoedema and renal failure—hypoplastic marrow with moderate diminution of all cell types.
2. *Tropical diseases*—(a) Kala-azar—L D. bodies may be readily distinguished within the monocytes. (b) Malaria—Marrow tissue for identifying the malarial parasite.
3. *Aleukemic leukaemia*—50% or more of the cells are primitive leucocytes though abnormal cells are absent or too few for diagnosis in peripheral blood.
4. *Myelomatosis*—infiltration with plasma cells.
5. *Reticulosis and reticulo-sarcoma*—marrow shows groups of abnormal reticulum cells or even reticulo-sarcoma cells even when there may not be clinical enlargement of lymph-glands.
6. *Malignancy*—at times secondary infiltrating cells from malignant tumours occur in marrow smears.
7. *Gaucher's disease*—reticulum-cells stuffed with abnormal lipoid.

B **For prognosis:**

1. *Primary form of thrombocytopenic purpura*—if the marrow shows increased activity of normoblasts and megakaryocytes. In this type the response to therapy is good but not in the secondary type.
2. *Chronic myeloid leukaemia*—if myeloblasts are 10% or less, response to treatment is likely to be good, if 50% or more the reverse.

increased if lung consolidated and large bronchi patent, diminished if much pleural thickening. Clubbing of fingers sometimes.

**Diagnosis**—

1. *Sputum*—Repeated examination necessary. In children examination of gastric washings or laryngeal swab for tubercle bacilli.
2. *X-ray*—Earliest lesion usually subapical or subclavicular patchy shadows.
3. *ESR*—Usually increased.
4. *Tuberculin test*—
   (a) *Mantoux test*—0.1 ml. of tuberculin solution is injected intradermally. The test is read at 48-72 hours. A positive test is indicated by an area of induration not less than 5 mm. in diameter. If active tuberculous infection is likely 1 TU should be used, otherwise 10 TU is normally used and the test repeated with 100 TU if the result is negative.
   (b) *Multipuncture test of Heaf*—Six multipunctures are made in the skin through a drop of PPD (purified protein derivative) containing 2 mg./ml. of tuberculin. The test site is read between 2 and 7 days. Positive reactions are divided into four grades—(i) 4-6 papules. (ii) Ring of induration. (iii) Disk of induration. (iv) Disk of induration 100 mm. and/or vesiculation. This indicates past or present infection with M. tuberculosis.
   (c) *Tuberculin Tine test*—The tines (prongs) dipped in old tuberculin are pressed on the skin on volar surface of forearm to form 4 puncture sites. A 3 mm palpable induration around one or more puncture sites after 48-72 hours indicates positive test.

*Factors which may depress the skin reaction in a positive reactor are*—(1) Old age. (2) Healed childhood tuberculosis. (3) Intercurrent severe illness with high fever. (4) Exanthematous disease (5) Sarcoidosis. (6) Miliary tuberculosis or overwhelming tuberculosis anywhere in the body. (7) Administration of corticosteroids. (8) Malignant lymphomas. (9) Recent infection so that hypersensitivity has not developed. (10) Inactive old tuberculin.

**Management:**

1. **Rest**—Indications—Pyrexia, haemoptysis, drug reaction, relapse.
2. **Chemotherapy**—Combination drug therapy is obligatory.

*Normal marrow*—Nucleated cells 20,000 to 100,000 per c mm. Predominant cells—granulocytes of normal type, and few normoblasts both showing some mitoses. Megakaryocytes present, other cells few. No abnormal cells.

*Causes of 'dry' or 'bloody tap'*—1. Acute myeloblastic or lymphoblastic leukaemia (preleukaemia stage). 2. Acute promyelocytic leukaemia. 3. 'Hairy' cell leukaemia 4. Myelosclerosis. 5. Refractory anaemia with cellular marrow. 6. Malignant infiltration of marrow.

## 9. BLOOD TRANSFUSION

**Indications:**

1. *Restoration of volume of circulating blood*:
   - (a) Acute haemorrhage—A useful guide is the level of systolic B.P. If this is below 100 mm. Hg., the blood volume is probably less than 70 per cent of normal.
   - (b) Burns—if extensive or deep.
   - (c) Operative surgery.
2. *Anaemia*—
   - (a) Iron deficiency anaemia or pernicious anaemia: (i) If Hb. level is below 4-5 gm. per cent. (ii) Presence of heart failure. (iii) Mental disturbance due to cerebral anoxemia. (iv) Need for immediate surgical intervention. (v) Severe infection likely to interfere with an adequate response to specific hematinic therapy. (vi) Delivery.
   - (b) Anemias refractory to therapies other than blood transfusion ("transfusion life")—e.g. patients with aplastic anemia, anemia of renal failure or of malignant disease, thalassemia and sickle-cell anemia.
   - (c) Hemolytic anemia—In congenital spherocytic anemia splenectomy is usually curative. Hence blood transfusion should be used to prepare the patient for this operation. In acquired hemolytic anemias transfusions may be necessary to alleviate the symptoms of acute anemia. Washed concentrated red cells are ideal for patients with acute or drug resistant acquired hemolytic anemia.
3. *Exchange transfusion*—for hemolytic disease of new-born, or neonatal hyperbilirubinemia from other causes.
4. *Platelet rich blood*—for thrombocytopenia with bleeding, or to cover some operation.

**Standard chemotherapy:**

First 2 months: Ethambutol
Rifampicin
Isoniazid

Next 7 months: Rifampicin
Isoniazid

**Drugs for Retreatment:**

| *Drug* | *Daily dose* | *Toxicity* |
|---|---|---|
| Ethionamide . Prothionamide | 1 g orally | Gastrointestinal upset, liver damage, mental disturbances, hypoglycemia, neuropathy |
| Pyrazinamide . . | 40 mg /kg orally | Hepatotoxicity, gout, fever, photosensitivity |
| Cycloserine . | 1 g orally | Epilepsy, mental disturbance |
| Capreomycin . | 15 mg /kg by inj. | Nephrotoxicity, hypokalemia, ototoxicity |
| Viomycin } Kanamycin } | 4-5 mg /week by inj. | |

3. **Corticosteroids**—Indications: (i) Tuberculous pneumonia. (ii) Miliary tuberculosis. (iii) Widespread infiltration. (iv) Pleural, pericardial or peritoneal effusion. (v) Acutely ill patients. (vi) Segmental opacities in primary pulmonary tuberculosis of less than 3 months duration thereby significantly lowering incidence of bronchiectasis. (vii) Suppression of hypersensitivity reactions to anti-tuberculous drugs. (viii) Tuberculous meningitis. (ix) Large lymph nodes involving or compressing trachea or bronchi.

4. **Surgery**—Surgical resection should be considered after 4 to 9 months of chemotherapy according to the extent of the disease. Pre-operative treatment should never be less than 2 months. Indications—(i) Cavitated lesion in lower lobe or well localised disease resistant to many drugs. (ii) Tuberculoma larger than 2 cm in diameter. (iii) Stenosis of bronchus with bronchiectasis. (iv) Failed thoracoplasty—Persistent cavity or persistently positive sputum 6 to 12 months after thoracoplasty, if opposite lung is healthy.

5 **Symptomatic treatment**—

(a) Cough—If irritative, linctus codein or linctus heroin one drachm t d s. or linctus of physeptone. No smoking if associated catarrh or laryngitis.

2. *Washed red blood cells*—(a) In patients in whom febrile transfusion reactions occur due to hypersensitivity to plasma. (b) Patients suffering from paroxysmal nocturnal hemoglobinuria. (c) For exchange transfusion of children with hemolytic disease of the newborn due to ABO incompatibility.
3. *Platelets*—Pre- and post-operative transfusion of patients undergoing cardiac surgery because platelet count falls during perfusion and hypothermia. For temporary remission in thrombocytopenia.
4. *Granulocyte*—transfusions in leukemic patients with life-threatening infections.

**Reactions to transfusions:**

1. *Febrile reactions*—due to leukoagglutinins in patients who have received multiple transfusions, or due to sensitivity to donor plasma or platelets, or pyrogenic substances present in the apparatus or transfusion solutions. Either slight rise of body temperature during or shortly after the transfusion or severe febrile reaction.
2. *Allergic reactions*—Urticarial wheals or bronchial spasm and facial oedema. Very rarely laryngeal oedema and collapse.
3. *Circulatory overload*—Cardiac failure may occur in patients with borderline cardiac decompensation.
4. *Hemolytic reaction*—due to incompatible blood An antigen-antibody reaction takes place and depending upon the strength of the reaction, the donor red cells may be only slightly damaged, or they may be completely hemolysed causing a shock-like state with acute renal failure.
5. *Transmission of disease*—Homologous serum hepatitis, malaria, syphilis. Rarely measles, variola, varicella, influenza, brucellosis.
6. *Reactions due to infected blood*—Endotoxin shock and peripheral failure due usually to gram-negative organisms.
7. *Thrombophlebitis*—especially if prolonged transfusion at one site and cannulation of vein.
8. *Immunological sensitization*—When a transfusion of Rh-positive blood is given to an Rh-negative patient the chances are 50:50 that he will or will not respond by making anti-D anti-body. In the male patient the danger then is that, should he later receive more Rh-positive blood, he may have a hemolytic transfusion reaction. The

early hours of morning. Sometimes no cough during day. Blood streaking of sputum not uncommon after paroxysm of cough. Rarely haemoptysis.
2. *Expiratory dyspnoea*—As paroxysms of cough become more frequent they are followed by wheezing and expiratory dyspnoea. Attacks simulating bronchial asthma may occur.
3. *Fever*—Common. 99 to 101°F. Usually continuous. Occasionally relapsing or intermittent. May rise to 104°F, initially following treatment.
4. *Loss of weight*—Usually with onset of disease. Poor appetite and disinclination for evening meal in order to check cough at night.
5. *General weakness and exhaustion.*
6. *Pain in chest*—Common symptom in adults, usually substernal and dull aching.
7. *Gastro-intestinal symptoms*—Attack of vomiting following paroxysm of cough common in children. Sometimes diarrhoea.
8. *Haemoptysis*—may occur in the hyperacute form of the disease.

**Signs:**
1. *Of asthmatic bronchitis*—with hyperresonance of chest, prolonged expiration and rhonchi and rales at bases.
2. *Sputum*—Scanty and viscid. Clumps of eosinophils.
3. *Spleen*—may be enlarged.
4. *Lymphadenopathy*—Often generalised.

**Diagnosis:**
1. *White cell count*—20,000-50,000/c mm., eosinophils 20-90%. Absolute eosinophil count more than 2,500 per c.mm.
2. *Filarial complement fixation test*—positive.
3. *X-ray*—(a) Diffuse mottling of the lungs usually bilateral and symmetrical, more coarse than miliary tuberculosis, or (b) prominent linear striations radiating from hilum, or (c) diffuse fan shaped streakings, or (d) ground glass appearance.

**Differential Diagnosis**—Other conditions associated with pulmonary infiltration with eosinophilia (PIE syndrome).
1. *Simple pulmonary eosinophilia* (Loeffler's syndrome)—Occurrence of transitory pulmonary infiltration associated with blood eosinophilia. Clears spontaneously within a month or more rapidly with steroids. Wheezing is uncommon and symptoms may be mild or minimal. Often idiopathic, or may be due to drug reaction or parasitic infestation.

Rh negative foetus pass into the maternal circulation. If these agglutinogens then pass across the placenta into the foetal circulation, agglutination and destruction of the red cells of the foetus will occur. The first child is usually not affected because isoimmunisation of the mother takes place slowly and it is only during second or subsequent pregnancies that sufficient agglutinin is formed to cause hemolysis. Transfusion of Rh positive blood to Rh negative woman may result in isoimmunisation and hemolytic disease of the newborn in a subsequent pregnancy. Only IgG isoantibodies are transmitted across the placenta.

Just as the ABO antigens are determined by pairs of genes or antigens for the group substances A, B, O, so the Rh groups are determined by similar but more complex set of antigens which occur in pairs C and c, D and d and E and e By far the most important is gene D. The commonly used terms Rh-positive and Rh-negative refer respectively to the presence or absence of the D antigen only.

2. ABO INCOMPATIBILITY—Spontaneously occurring IgG isoantibodies may appear within the ABO blood group system from previous isoimmunisation or for no obvious reason. ABO incompatibility is responsible for about half of all cases of neonatal hemolytic disease. ABO incompatibility rarely causes dangerous neonatal hemolysis.

**Clinical features:**

I. **Hemolytic disease of the foetus—**

(a) *Macerated foetus.*

(b) *Hydrops foetalis*—Severe oedema, pallor, yellow vernix, hepatosplenomegaly and petechial bleeding The foetus usually dies in utero about 6 weeks before term or may die within a few hours after birth.

II **Hemolytic disease of the newborn—**

1. *Icterus gravis neonatorum*—The baby is not born jaundiced but becomes so within a few hours of birth. Jaundice reaches a maximum by the third or fourth day. At bilirubin levels of 20 mg/100 ml (345 $\mu$ mol/litre) or more kernicterus may develop with lethargy, hypotonia and poor feeding. This goes on to a state characterised by head retraction and generalised hypertonia. Mild cases may survive to develop the post-kernicterus syndrome of athetoid cerebral palsy, nerve deafness and dental enamel dysplasia.
2. *Hemolytic anemia*—Mildest form of the disease due to only slight sensitisation of the mother. Mild neonatal icterus may be present.

and diffuse infiltration by eosinophils of many body organs. The most severe form of the disease is eosinophilic leukemia.

10. *Polyarteritis nodosa*—Blood eosinophilia with pulmonary involvement may occur late in the course of the disease. (Also see differential diagnosis of bronchial asthma).

**Management:** Diethylcarbamazine 50 mg. q.d.s. for one month. Three such courses may be repeated at monthly intervals to prevent relapse.

## 11. BRONCHOGENIC CARCINOMA

**Etiology:**

*Age*—chiefly 40 to 55 *Sex*—4 times more common in males *Predisposing factors*—(1) Cigarette smoking—Risk of bronchogenic carcinoma varies directly with the number of cigarettes smoked. After stopping smoking the risk declines rapidly and after 10 years approaches that of non-smokers (2) Occupational exposure—to radioactive gases, asbestos, arsenic, nickle, chromates, metallic iron and iron oxides, coal gas manufacture. (3) Atmospheric pollution—Urban malignancy twice that of rural areas. (4) Chronic bronchitis (5) Racial factors. (6) Pulmonary fibrosis—Carcinoma may arise in old scar tissue.

**Symptoms:**

I **Non-specific—**

Weakness, loss of weight, tiredness, anorexia and fever.

II **Respiratory symptoms—**

1. Cough—usually with mucopurulent sputum, haemoptysis, dyspnoea, failure of chest infection to resolve. Rarely wheezing or stridor due to narrowing of large bronchus or trachea.
2 Chest pain—may be : (a) intermittent discomfort or pain on same side as lesion usually worse at night, (b) pleural pain from local pneumonia or carcinomatous involvement of pleura, or (c) persistent, severe localised pain with radiation along distribution of intercostal nerve

III **Symptoms due to local spread—**

1. *Nerves*—(a) Phrenic nerve—intractable hiccough, paresis of diaphragm. (b) Recurrent laryngeal nerve—hoarseness or aphonia, bovine cough (c) Cervical sympathetic—Horner's syndrome. (d) Vagus—Gastric symptoms. (e) Brachial plexus—Lower part involvement with pain around shoulder joint and in arm with sensory impairment along ulnar border of forearm and hand and development of muscular

*Quantity of blood exchanged*—80 ml. per lb of weight i.e. twice the expected blood volume of the patient. Therapy of choice both for correction of anemia and for control of hyperbilirubinemia. *Indications*—Prematurity, history of severe erythroblastosis or kernicterus in previous siblings, development of signs of central nervous system involvement, hypoalbuminemia, or a level of Hb of 12 g/100 ml (12 g/decilitre) or under, or a bilirubin level of 4 mg/100 ml (68 $\mu$ mol/litre) or more. Repeated transfusions may be necessary to maintain level of serum bilirubin at less than 20 mg per 100 ml. In case of ABO incompatibility fresh group O blood of the same Rh (D) group should be used.

The mother should not be permitted to nurse the infant with erythroblastosis, because anti-Rh agglutinins have been found in breast milk.

## 11. THE SPLEEN

**Functions of the Spleen :**

1. *Filtration*—of abnormal particulate material from circulating blood, e.g. effete cells, micro-organisms and immune complexes.
2. *Phagocytosis*—by means of macrophages.
3. *Blood cell destruction*—Destruction of senescent red cells and platelets. Since this function is shared by other parts of RES, red cell life span is not normally affected by splenectomy. In pathological conditions spleen may become the predominant site of destruction.
4. *Blood cell production*—mainly post-natal lymphopoiesis. Erythropoiesis only occurs in the adult under pathological circumstances.
5. *Immune responsiveness*—The spleen contributes to antibody-formation, and probably cell-mediated immune responses, in response to antigens carried in the blood. Useful if immune mechanisms are weakened
6. *Regulation of hemopoiesis*—probably but of no clinical significance.
7. *Storage*—of platelets, iron and some proteins including factor VIII.

**Causes of splenomegaly :**

1. **Infectious—**
   (a) *Bacterial*—Septicemia, typhoid, bacterial endocarditis, tuberculosis, syphilis, brucellosis.

3. *Signs of mediastinal obstruction.*
4. *Signs of pleural effusion*—Any middle aged patient who has fluid in one pleural cavity for no apparent reason is likely to have an underlying growth.

*Superior pulmonary sulcus tumour* (Pancoast's tumour)—(i) Severe homolateral pain of shoulder and arm with wasting of arm and hand muscles. (ii) Horner's syndrome on affected side. (iii) Local destruction of bones and infiltration of soft structures by tumour. (iv) Dullness at apex on percussion.

**Diagnosis :**

1. *Radiography*—Types of lesions—(a) Peripheral round mass. May be fairly well defined or more often with irregular outline. (b) Collapse of segment, lobe or lung with or without hilar shadows. (c) Effusion usually large. It may not be possible to see the pulmonary lesion even after total aspiration (d) Hilar shadow—due to tumour or hilar lymph nodes or both. It may be associated with diaphragmatic paralysis as revealed by paradoxical movement of the affected diaphragm. (e) Mediastinal widening due to paratracheal lymph node enlargement. (f) Diffuse shadows due to bronchopneumonic, lymphatic or fibrotic changes in relation to cancer. (g) Lung abscess due to breakdown of tumour or from infection in the lung beyond a malignant obstruction.

*Tomography*—may outline coin shadows or cavity or lymph node metastasis better than routine chest x-ray.

2. *Bronchoscopy*—Suspicious narrowing or distortion of bronchial tree. Essential investigation for determining operability of tumour.
3. *Sputum cytology*—Studies of sputum and bronchial washings for cancer cells.
4. *Lung scanning*—is often useful. Defects of perfusion usually exceed those in ventilation, e.g. a small central carcinoma may show a striking perfusion loss despite only a borderline change on x-ray.
5. *Biopsy*—(a) At bronchoscopy or thoracotomy. (b) Scalene lymph node biopsy can provide evidence of inoperability simultaneously with a definite diagnosis whenever enlarged lymph nodes can be palpated in supraclavicular fossa (c) Aspiration percutaneous lung biopsy for diagnosis of peripheral lung tumours involving pleura.
6 *Mediastinoscopy*—to assist in diagnosis. More useful in deciding whether thoracotomy is justifiable. Contraindicated in superior vena caval obstruction.

II. GENERAL EFFECTS—

1. *Hypersplenism*—The syndrome is diagnosed when the following are found together in absence of immature cells in peripheral blood—(a) detectable splenomegaly, (b) anemia, leucopenia or thrombocytopenia, (c) normal or hypercellular bone marrow. Several different mechanisms may be responsible in an individual patient.
2. *Red cell destruction*—in conditions characterised by specific abnormality of red cell viz. hereditary spherocytosis, hemolytic cases of hereditary elliptocytosis and warm-antibody type of autoimmune hemolytic disease. Lesser degrees of red cell destruction occurs when there is marked splenic enlargement.
3. *Red cell pooling*—occurs in most enlarged spleens and is a drain on red cell volume from functional circulation of blood.
4. *Hypervolemia*—Marked splenomegaly leads to hyperkinetic portal hypertension produced by high blood flow through the enlarged spleen.
5. *Thrombocytopenia*—In about 80% cases of chronic ITP there is excessive platelet destruction predominantly in the spleen. It may also occur in chronic lymphatic leukaemia and SLE.
6. *Leucopenia*—Leucopenia, and especially neutropenia, is commonly found in conditions where there is a splenomegaly, such as Felty's syndrome.

**Investigation of a case of Splenomegaly (or Hepatosplenomegaly) :**

**History—**

1. *Age*—childhood cirrhosis between ages of 1 and 3 years.
2. *Sex*—hemochromatosis more common in males.
3. *Family history*—in hereditary spherocytosis, hemochromatosis, Gaucher's disease.
4. *Personal history*—as regards diet, alcoholic intake
5. *Past history*—of fever with rigors in malaria, history of jaundice and gastro-intestinal bleeding.
6. *Fever*—Infections like malaria, kala-azar, typhoid, miliary tuberculosis, subacute bacterial endocarditis, brucellosis, etc. Leukemia, leucosarcoma and Hodgkin's disease, disseminated lupus, sarcoidosis.

phosgene, mustard gas, ozone, paraquat, polymer fumes, certain metallic salts

7. Inhalation of gastric acid (Mendelson's syndrome).
8. Rapid aspiration of large pleural effusion.
9. High altitude pulmonary oedema
10. Uremia.
11. Trauma—capillary damage causing 'leaky lung'.
12. Toxic—(a) Drug-induced—IV narcotic abuse particularly heroin, methadone, salicylates, propoxyphene. Cytotoxic drugs as busulphan, bleomycin, cyclophosphamide. Nitrofurantoin (b) Poisoning—Alcohol, organo-phosphorus. barbiturates.
13. Hypersensitive response—Blood transfusion (may be due also to fluid overload), angioneurotic oedema, SLE, Goodpasteur's syndrome.

**Clinical picture:** of acute pulmonary oedema:

1. Onset—Sudden.
2. Feeling of oppression in chest.
3. Acute and distressing dyspnoea.
4. Incessant short cough and copious frothy, sometimes blood tinged fluid from mouth and nose Phenomena of "cough, cough, cough—spit, spit, spit".
5. Sweats
6. Feeble pulse
7. Bubbling rales first at base, then over entire chest. Other physical signs relating to the cause of oedema e g. septicemia.
8. Fall of temperature.
9. Termination—may be fatal in few hours, the moist sounds increasing and becoming audible at a distance (death rattle), or symptoms may persist for 12-24 hours and disappear.

*X-ray*—"Batswing" appearance of confluent shadows extending from hilar region into midzones. A radiological feature of pulmonary oedema fluid is that it shifts with gravity into the bases when patient is upright, or to dependent lung if patient is on his side

**Management:** (1) For treatment of acute left ventricular failure see p. 196 (2) For oedema due to defective pulmonary drainage e g chronic disease, coma, overdosage of drugs—(a) Maintenance of airway, (b) tracheobronchial suction through catheter, (c) bronchoscopy or tracheostomy and drainage, (d) administration of oxygen under pressure by mechanical assistance. (3) For circulatory overload—IV frusemide. (4) Corticosteroids—in high doses for pneumonia, septicemia and Mendel-

**Investigations—**

1. *Blood picture and blood tests—*
   (a) *Leucopenia*—Typhoid, malaria, kala-azar, syphilis, tuberculosis, sarcoid, portal hypertension, non-specific hyperplasia, neoplasm of spleen such as primary lymphosarcoma, hemangioma or cyst, rheumatoid arthritis (Felty's syndrome).
   (b) *Leucocytosis*—Pyogenic infections, infectious mononucleosis, leukemias, polycythemia, most hemolytic anemias.
   (c) *Pancytosis*—Polycythemia.
   (d) *Reticulocytosis*—in hemolytic anemia.
   (e) *Thrombocytopenia*—in leukemia and leucosarcoma.
   (f) *Blood smear*—for diagnosis of malaria, leukemia, polycythemia, infectious mononucleosis, hereditary spherocytosis.
   (g) *Blood culture*—in subacute bacterial endocarditis.
   (h) *Special tests*—(a) Serum bilirubin—in hemolytic anemias. (b) Sero-flocculation tests—for kala-azar. (c) Blood test— for syphilis. (d) Paul-Bunnell test—for infectious mononucleosis (e) Tests for abnormal hemoglobins, and Coomb's test in thalassemias (Cooley's anemia). (f) Congo red test for amyloidosis. (g) Serum iron—raised in hemochromatosis. (h) Serum copper—low levels in Wilson's disease. (i) L E. cell test—L.E. cells in leucocytes obtained from blood and marrow. (j) Red cell survival time.
2. *Radiology*—(a) *Plain film of abdomen*—for detecting splenic enlargement. Enlargement may also produce a raised left hemi-diaphragm, and displace adjacent organs in a barium meal or barium enema film or IV pyelogram (b) Chest—for miliary tuberculosis, sarcoidosis, Hodgkin's disease and histoplasmosis. (c) Bones—expansion of lower ends of long bones especially femur in Gaucher's disease, increased density in myeloid metaplasia, and 'hair-on-end' or 'brush' appearance of skull in thalassemia.
3. *Radioisotopic spleen scanning*—(a) Detects enlargement of spleen. (b) It can indicate focal lesions, infarcts, splenic rupture, accessory spleen and absence or hypoplasia of the spleen. (c) Sequential estimates of organ radioactivity after injection of chromium 51-labelled autologous red cells gives estimate of red cell pooling and destruction in hemolytic anemias If splenic destruction is significantly greater than

3. *Chest pain*—(a) In precordium or retrosternal like angina or cardiac infarction. (b) Pain due to pleurisy may appear after few hours or days. Pain is usually worse on deep inspiration.
4. *Haemoptysis*—may occur.

**Signs:**

1. *Due to diminished cardiac output*—Sinus tachycardia. Hypotension, shock, impaired concentration, low urine flow.
2. *Due to pulmonary hypertension and right ventricular failure*—Raised JVP, hepatic enlargement, diastolic gallop to left of midsternum. Pulmonic component of 2nd sound accentuated. Systolic murmur may appear in pulmonary area, it may have a scratchy quality suggesting pericardial friction rub. Systolic murmur may appear along left sternal border due to functional tricuspid regurgitation from right ventricular dilatation. Sometimes arrhythmias.
3. *Due to disturbance of pulmonary ventilation and perfusion*—Central cyanosis.
4. *Due to pulmonary infarction*—Usually after 12-24 hours. Fever, pleural rub, signs of consolidation. Effusion may develop, usually haemorrhagic

**Diagnosis:**

1. *X-ray*—may show one or more of 3 radiological signs—(i) Opacity produced by infarction. (ii) Small pleural effusion. (iii) Raised diaphragm which moves poorly on respiration.
2. *E C G.*—(i) $S_1Q_3T_3$ patterns—S wave in lead I, Q wave in lead III with T inversion (ii) $S_1Q_3T_3$ plus T inversion in $V_1$-$V_3$ or $V_4$. (iii) RBBB. or (iv) Normal.
3. *Blood gases*—With massive pulmonary embolism low $PO_2$ with low $PCO_2$.
4. *Pulmonary angiography*—Emboli may be seen as filling defects.
5. *Lung scan*—Large embolic occulsions may result in areas of absent radio-activity due to poor perfusion.

**Management:**

A Medical—

1. *Relief of pain and apprehension*—Morphine or pethidine
2. *Oxygen*—to relieve hypoxia
3. *Anticoagulant*—Heparin bolus 5,000 units IV. Oral anticoagulant started concurrently, should be given for atleast 3 weeks.

2. INFECTIONS SUBACUTE AND CHRONIC—

(a) *Chronic malaria*—

(i) History of fever with rigors with classical features of the attack—cold stage, hot stage, sweating stage.
(ii) Spleen very large and firm.
(iii) Liver may be enlarged.
(iv) Severe anemia.
(v) Malarial parasites in peripheral blood or sternal marrow.
(vi) Leucopenia.
(vii) Therapeutic test with adequate dose of anti-malarial drug during fever.

(b) *Kala-azar*—

(i) Residence in endemic area.
(ii) Progressive enlargement of spleen which may have a doughy consistency.
(iii) Double rise of temperature in 24 hours may be seen.
(iv) Liver enlarged but not grossly like spleen.
(v) Loss of hair and pigmentation of skin.
(vi) Sternal puncture shows L.D. bodies. Demonstration of parasite on culture.

(c) *Subacute bacterial endocarditis*—

(i) Unexplained fever.
(ii) Presence of cardiac murmur.
(iii) Presence of petechiae, anemia, peripheral emboli; clubbing of fingers.
(iv) Red cells in urine.
(v) Positive blood culture.

(d) *Brucellosis*—

(i) History of ingestion of raw milk, or occupation hazard in veterinary surgeons, laboratory personnel or slaughter house worker.
(ii) Patient not toxic in spite of high fever.
(iii) Spleen of moderate size, rarely massive.
(iv) Liver may be enlarged particularly if spleen is very large.
(v) Back pain common.
(vi) Culture of organism from blood or bone marrow or liver biopsy, positive agglutination and intradermal tests.

2. *Disorders of pulmonary vessels*—Recurrent pulmonary embolism, primary pulmonary hypertension, sickle cell anaemia, schistosomiasis, polyarteritis nodosa, amyloid disease, pulmonary hypertension of high altitude.
3. *Disorders affecting movements of thoracic cage*—Gross kyphoscoliosis, severe pectus excavatum, extreme obesity (Pickwickian syndrome), thoracoplasty, pleural fibrosis, chronic neuromuscular disorders such as poliomyelitis, muscular dystrophy.

**Clinical Features:**

1. COMPENSATED STAGE—
   (a) Evidence of basic lung or pulmonary vascular or thoracic cage disease.
   (b) *Pulmonary hypertension*—(i) *Symptoms*—Angina, syncope and fatigue due to low fixed cardiac output. (ii) *Signs*—Peripheral cyanosis becoming central on exertion, small peripheral pulse, giant 'a' waves in jugular veins, right ventricular heave, closely split 2nd heart sound with loud $P_2$, ejection click and occasionally pulmonary systolic or diastolic murmur.
2 DECOMPENSATED STAGE (Blue bloater)—Signs of right sided failure namely hepatic tenderness, oedema of ankles, right ventricular gallop. Because of raised cardiac output the hands are warm and blue, full volume pulse of collapsing type and capillary pulsations.

**Investigations:**

1. *E.C.G*—RV hypertrophy and P pulmonale. Partial or complete RBBB may eventually appear.
2. *Polycythemia*—closely related to degree of chronic hypoxemia between exacerbations
3 *X-ray*—With established pulmonary hypertension proximal enlargement of pulmonary arteries with diminished peripheral vascular shadows
4 *Ventilatory function*—Pattern of airways obstruction ($FEV_1/FVC$ ratio reduced) in patients with chronic bronchitis and emphysema Restrictive defect ($FEV_1/FVC$ ratio normal) with diffuse interstitial lung disease.

**Management:**

1. *Management of pulmonary disease*—
   (a) *Specific therapy*—if possible for basic pulmonary disease such as tuberculosis or bronchiectasis.

(vi) Bone marrow aspiration often unproductive, trephine is required to demonstrate fibrotic change.
(vii) X-ray—Ground glass appearance of bones of axial skeleton.

(d) *Essential thrombocythemia*—
(i) Bleeding—from GI tract or spontaneous bleeding after minor trauma resulting in large hematomas. Purpura rare.
(ii) Gross splenomegaly does not occur.
(iii) Very high peripheral platelet count and increased number of megakaryocytes in bone marrow.

4. LYMPHOPROLIFERATIVE DISORDERS—
(a) *Chronic lymphocytic leukaemia*—
(i) Mostly in second half of life and more in males.
(ii) Enlargement of lymph glands, infiltration of salivary glands, infiltration of serous membranes resulting in pleural or pericardial effusion, skin infiltration with nodules.
(iii) Peripheral lymphocytosis and increase in mature lymphocytes in bone marrow.

(b) *Hodgkin's disease*—
(i) Most often in young adults.
(ii) Localised painless lymphadenopathy—in neck, axilla or inguinal region in decreasing order of frequency.
(iii) Occasionally involvement of mediastinal nodes, spleen, liver and extralymphatic deposits in skin may be presenting symptom.
(iv) Systemic symptoms—Fever, sweating, weight loss.
(v) Diagnosis—Presence of Reed-Sternberg cells in gland biopsy.

5. ANAEMIAS—
(a) *Chronic hemolytic anemia*—
(i) Anemia varies from time to time but develops rapidly with hemolytic crises.
(ii) Jaundice usually mild and of lemon yellow tint.
(iii) Features of chronic cholecystitis due to pigment gallstones.
(iv) Ulcers of the legs and pigmentation from old ulcers, usually over the malleoli may be seen.
(v) Evidence of hemolysis in blood—Reticulocytosis and upto 1 normoblast per 100 leucocytes.

(b) *Iron deficiency anaemia*—
(i) Mild degree of splenomegaly with hepatomegaly.
(ii) Nail changes—Platynychia and koilonychia.

units once or twice daily together with oral penicillin for 6 weeks. If sensitivity tests demand streptomycin, or tetracycline or sulphonamide may be added.

(b) NOCARDIOSIS—caused by Nocardia asteroides. May develop in agricultural workers. Disease pattern resembles that of tuberculosis but it tends to be more acute, lung abscesses may form, and infection may involve the brain. *Treatment*—Same as actinomycosis, the organism also responds to sulphonamide

2 **Diseases due to yeast and yeast-like fungi—**

(a) MONILIASIS—due to Candida albicans A condition similar to thrush may occur in the bronchi resulting in irritating cough. Rarely moniliasis may invade the lung producing acute illness. Chest radiographs show ill-defined opacities in upper lobe, and occasionally septicemia with endocarditis or meningitis results. *Management*—Removal of iatrogenic cause such as tetracycline. Inhalation of nystatin. Pot iodide by mouth In severe infections Amphotericin-B.

(b) TORULOSIS—caused by Cryptococcus neoformans. If inhaled, it sets up a primary pulmonary lesion, usually minimal, but it may spread in the lung, producing a granulomatous consolidation resembling a tumour (toruloma), and may also cavitate. Lymphomas such as Hodgkin's disease often predispose to this condition. Diagnosis is by sputum mycology and by biopsy of bronchus or lung *Treatment*—If a chronic lesion persists, surgical excision covered by fungicide therapy with Amphotericin-B or Hydroxystilbamidine.

3 **Diseases due to filamentous fungi—**

(a) ASPERGILLOSIS—Aspergillus fumigatus is of chief importance, and agricultural workers are at special risk. The fungus may infect a lung previously damaged by a tuberculous cavity, unresolved pneumonia, pulmonary infarct or bronchiectasis Three types of broncho-pulmonary aspergillosis are known—

(i) *Allergic*—Constitutes one variety of allergic lung Recurrent febrile episodes with cough, wheeziness and expectoration of characteristic dark-yellow or brown sputum plugs. X-ray—Segmental or lobar or more diffuse opacities resulting from bronchial obstruction by sputum plugs. Blood may show marked eosinophilia and sputum is full of eosinophils as well as Aspergillus fumigatus. Usually these episodes resolve after few weeks, or may lead to bronchiectasis. Aspergillin skin test is positive. *Treatment*—Acute episodes respond to penicillin and corticosteroids.

Regression of above features with antimalarial treatment and prolonged prophylaxis.

9. SARCOIDOSIS—(i) Splenomegaly usually moderate; may be slight or massive (ii) Non-ulcerating nodular skin lesions (iii) Lymph node enlargement in mediastinum or elsewhere (iv) Characteristic X-ray picture of lungs with bilateral hilar lymphadenopathy, and of digital bones. (v) Histological picture of gland one of miliary epitheloid tubercles without surrounding zone of infiltration and without areas of necrosis. Liver biopsy may show histological evidence of sarcoid tissue (vi) Depression of skin sensitivity to tuberculin common. (vii) Kveim reaction may be positive.

10. AMYLOID DISEASE—(i) Evidence of long standing suppuration (ii) Hepatomegaly (iii) Diarrhoea (iv) Albuminuria. (v) Congo red test positive. (vi) Liver or gingival biopsy may reveal amyloid material.

11. LIPOID GRANULOMATOSIS—

| | *Gaucher's disease* | *Niemann-Pick's disease* | *Hand-Christian disease* |
|---|---|---|---|
| Familial predisposition | Frequent | None | None |
| Age | Onset in childhood | Infancy | Early childhood |
| Spleen | Marked splenomegaly | Moderate splenomegaly | Slight to moderate splenomegaly |
| Other features | Chronic progressive anaemia<br>Leucopenia<br>Haemorrhages<br>Cortical thinning of long bones<br>Skin and conjunctival pigmentation | Slight or no anaemia<br>Leucocytosis<br>Gastro-intestinal disorders<br>Retarded development<br>Brown skin pigmentation | Diabetes insipidus<br>Exophthalmos<br>Defects in membrane bones<br>Retarded development |
| Course and prognosis | Chronic course | Short course. Fatal within 2 years | Slow course Fatal in 50% |

IN CHILDREN—

(a) *Congenital syphilis*—Spleen usually enlarged two fingers breadth below the costal margin, smooth and firm. Dermal and visceral manifestations of syphilis. Positive Wassermann test.

(b) *Infantile childhood cirrhosis*—Predominantly in boys aged 1-3 years. Progressive hepatic failure with hepatomegaly, splenomegaly, jaundice and ascites.

(c) *Thalassemia major*—(i) Mongoloid facies. (ii) Spleno-

or chronic pulmonary infection. Chest x-rays show massive areas of consolidation. Often fatal but may respond to Amphotericin-B or Hydroxystilbamidine.

(d) SPOROTRICHOSIS—caused by Sporotrichum schenkii occurs in farmers, nurserymen or woodmen. Usually affects skin first, and the disease may then spread to involve the lungs, or primary pulmonary infection which may become chronic. X-rays—Enlarged hilar shadows, miliary mottling and thin-walled cavities. Diagnosis by specific skin test and finding precipitating antibody in serum. *Treatment*—Potassium iodide. Other fungicides may be necessary.

**Fungicidal drugs:** for bronchopulmonary mycoses.

1. *Nystatin*—Aerosol containing 100,000 units per ml. For local treatment aqueous suspension containing 200,000 units per ml., or as a paste containing 45,000 units per ml.
2. *Natamycin*—2.5% aqueous suspension as aerosol three times daily for 4-6 weeks. Can be used for local application in aspergillosis.
3. *Amphotericin-B*—1 mg/kg body weight in 5% glucose saline in concentration of 1 mg. per 5-10 ml. IV very slowly. Toxic reactions common—fever, chills, nausea, vomiting, rash. Advisable to start with 1 mg., increasing to 10 mg. and then to 25 mg. daily upto 10 weeks. Dose can be reduced to 0.3-0.5 mg/kg daily if combined with 5-fluorocytosine.
4. *Fluorocytosine*—150-200 mg/kg daily in four divided doses.
5. *Miconazole*—Oral 300-600 mg t.d.s. or IV. Side effects—pruritus, thrombophlebitis or rarely anaphylaxis.
6. *Hydroxystilbamidine*—2-3 mg/kg in 5% glucose saline by slow IV drip. Daily dose of 250 mg. in 200 ml. for 10-15 days usually suffices. Less toxic than Amphotericin-B.
7. *Brilliant green*—1 : 5000 dilution as aerosol.
8. *Potassium iodide*—Saturated solution by mouth starting with 3 drops in 30 ml. water t.d.s. after meals increasing the dose by 1 drop every three days to 30 drops t.d.s.

## 15. SARCOIDOSIS

**Definition**—Sarcoidosis is a systemic granulomatous disease involving several organs, most often mediastinal and peripheral lymph nodes, lungs, liver, spleen, skin and eyes Pathologically it is characterised by the presence of epithelioid cell tubercles without caseation in all of several affected organs.

# 5. The Endocrine Glands

## 1. THE PITUITARY GLAND

### THE HYPOTHALAMUS AND ANTERIOR PITUITARY

#### HYPERPITUITARISM

#### Gigantism

*Definition*—Gigantism or excessive growth in height is due to excessive production of growth hormone from acidophil-cell hyperplasia, or from an acidophilic adenoma of anterior pituitary.

*Clinical features*—Usually found in men. Height between 7 to 8 feet. Patients often have manifestations of acromegaly if excessive growth hormone stimulus was continued beyond period of epiphyseal closure. Skeletal muscles may be powerfully developed but later pituitary insufficiency may occur with associated muscular weakness. There may be hypertension.

*X-ray skull*—Enlargement of sella, tumor may extend into sphenoidal sinus.

*Treatment*—Same as acromegaly.

#### Acromegaly

**Definition**—Acromegaly is a disease of adult life characterized by growth in bulk but not in length of the bones, especially of the extremities (acra) from oversecretion of growth hormone due to an eosinophilic, chromophobe or mixed cell adenoma of anterior pituitary, rarely due to hyperplasia.

**Clinical features:**

1. *Due to increase of intrasellar pressure*—Headache, vomiting
2. *Due to pressure upon adjacent optic chiasma and nerves*—If tumor overflows the confines of expanded sella. Bitemporal hemianopia, later complete blindness. Primary optic atrophy Compression of cranial nerves and frontal and temporosphenoidal lobes with resultant ocular palsies, deafness and cerebral symptoms, e.g., hemiparesis, mental changes and convulsions.

form of purplish-red nodule at site of injection in 90% with BHL, 70% with pulmonary infiltrates.

3. *Tuberculin test*—Depression of tuberculin skin sensitivity.

**Differential Diagnosis:**

1 *Of bilateral hilar node enlargement*—(a) Sarcoidosis—Fever, erythema nodosum and febrile arthralgia. (b) Tuberculosis—Usually unilateral, high tuberculin sensitivity. (c) Lymphoma—Pain, systemic disturbance, positive biopsy. (d) Leukemia—Blood count diagnostic (e) Metastatic malignancy. (f) Beryllium disease—Occupational exposure. (g) Hypogammagloubulinemia—Recurrent infections.

2. *Of chronic pulmonary infiltration*—(a) Sarcoidosis—Disparity between gross x-ray shadows and minimal symptoms and signs (b) Miliary tuberculosis—Severe systemic symptoms, choroidal tubercles and positive bacteriology. (c) Pneumoconiosis—Occupational exposure. (d) Tropical eosinophilia. (e) Metastatic malignancy—Evidence of primary. (f) Alveolar cell carcinoma—Sputum may contain malignant cells (g) Extrinsic allergic alveolitis, fibrosing alveolitis, lymphangitic carcinomatosis—Disparity between minimal x-ray shadows and severe symptoms and signs (h) Eosinophilic granuloma—Bone cysts, recurrent pneumothorax. (i) Honeycomb lung—Mesodermal dysplasia or eosinophilic granuloma.

**Management:** Mainly symptomatic since spontaneous resolution occurs in most cases. (1) *Antibacterial drugs*—during episodes of infection. (2) *Corticosteroids*—may hold up the progress of the disease and suppress some of the symptoms. Indications—(a) Patients disabled by the disease. (b) Acute type in younger patients (c) Persistent hypercalcemia (in combination with sodium cellulose phosphate). (d) CNS and myocardial sarcoidosis. (e) Uveitis.

## 16. PULMONARY FIBROSIS

**Causes:**

I. LOCALISED—(a) Pulmonary—Lung abscess, pulmonary infarction, atelectasis, bronchiectasis, radiation fibrosis Lobar fibrosis as result of lobar pneumonia. (b) Pleurogenous—Chronic pleurisy or empyema.

II. DIFFUSE—

(1) *Diffuse fibrosing lung disease*—(a) *Acute*—Hamman-Rich syndrome. (b) *Chronic*—Fibrosing alveolitis (chronic interstitial pneumonia).

gland. Allows much greater dose of irradiation to the pituitary. (ii) *Surgical hypophysectomy*—if visual field defect.

2. *Bromocriptine*—will reduce GH secretion to normal in a few, and by 50% in many more. Dose: 5 mg. q.d.s. The drug may initially cause nausea and hypertension.

### Cushing's Disease

Cushing's disease results from basophilic adenoma of anterior pituitary. (See Cushing's syndrome.)

### Hyperprolactinemia

Due to prolactin secreting tumor. *Clinical features*—*In females*: Galactorrhea, amenorrhoea and infertility. *In men*: Hypogonadism, impotence and infertility due to reduced testosterone secretion. Gynecomastia with galactorrhea may occur. *Treatment*—as in acromegaly.

### Precocious puberty

In girls most often due to premature secretion of gonadotrophins in excess of that appropriate to a person's age resulting in premature development of secondary sex characters and rapid skeletal growth. *Treatment*—Medroxyprogesterone (Provera) 100 mg of depopreparation every 2 weeks, later increased to 300 mg every 2 weeks. In boys, most often a pathological lesion exists and must be looked for.

## HYPOPITUITARISM

**Juvenile onset**—(a) Selective gonadotrophic failure—Normal or increased stature, eunuchoid habitus, gonadal and genital underdevelopment; amenorrhoea in females. (b) Selective growth hormone failure with dwarfism. (c) Panhypopituitarism.

**Adult panhypopituitarism** (Simmond's disease)

**Causes**—(a) Pituitary tumours. (b) Tumours in region of hypothalamus. (c) Granulomas—Tuberculosis, sarcoidosis, histiocytosis, syphilis. (d) Infarction—Post-partum necrosis (Sheehan's syndrome), pituitary apoplexy. (e) Unknown especially isolated defects. (f) Miscellaneous—Hemochromatosis, trauma, maternal deprivation, after treatment of pituitary lesion.

*Clinical features—Symptoms*: Gradually progressive dyspnoea associated with chronic cough, dry or productive of only small amounts of clear mucoid sputum, sometimes blood stained. Dyspnoea develops rapidly with minimal exertion. Weight loss and fatigue. *Signs*—Central cyanosis particularly after exercise. Finger clubbing may occur. Diminished chest expansion in advanced cases. Showers of fine basal crepitations at the end of inspiration and unchanged by coughing characteristic. May extend to mid and upper zones.

*Diagnosis*—(a) *X-ray*—Diffuse micronodular or reticular fibrotic pattern most striking in the bases. With progression the contraction of interstitial tissue causes dilatation of smaller, less rigid airways leading to appearance of multiple small radiolucencies—'honeycomb lung'. No pleural involvement. (b) *Lung biopsy*—Scattered patchy foci of interstitial fibrosis (c) *Pulmonary function tests*—show restrictive defect.

*Management*—Corticosteroids Start with 40-60 mg. prednisolone daily and monitor clinical, radiological and pulmonary function test response. The drug is given for 1-2 months and then withdrawn or continued in low maintenance dose.

## 17. INDUSTRIAL PULMONARY DISEASE

**Types of lung reaction:**

1. Acute pulmonary oedema coming on within minutes or hours of exposure.
2. Acute tracheitis and bronchitis.
3. Destructive changes in lung parenchyma resulting ultimately in pulmonary emphysema and chronic airways obstruction.
4. Bronchial asthma.
5. Pulmonary fibrosis slowly progressing to cause restrictive disorder of lung function.
6. Malignant disease of lung or pleura after prolonged exposure.

**Clinical features:** depend on the type of inhalation.

1. ACUTE TRACHEOBRONCHIAL OR LUNG IRRITATION—e.g gases such as ammonia, chlorine, fluorine, bromine, sulphur dioxide or nitrogen oxide. Metallic fumes or some metallic dusts e.g. cadmium, zinc, magnesium. Symptoms of tightness of chest, hoarseness of voice, cough and wheezing, acute pulmonary oedema. Rarely acute chemical pneumonia.

2. PNEUMOCONIOSIS—Pulmonary disease resulting from inhalation of dust over sufficient length of time resulting in fibrosis of lung.

## Pituitary Dwarfism

*Cause*—Congenital (and some times hereditary) deficiency of the anterior pituitary growth hormone or destructive pituitary lesion in childhood. If gonadotrophin output is also affected sexual development is retarded with production of infantilism.

*Clinical features*—Very slow rate of growth and hypoglycemic attacks in childhood. No mental defect and no disproportion between relative sizes of the body and limbs of the child. Hypogonadism may be superadded. The bones are often thin and centres of ossification delayed in appearance.

*Treatment*—2 mg. or more of human growth hormone IM two or three times weekly for an indefinite period until optimal growth or cessation of response is observed. Thyroid hormone, adrenal corticoids and testosterone or oestrogen are given only if needed.

**Causes and differential diagnosis of Dwarfism:**

1. *Familial*—usually one of the parents has a short stature
2. *Constitutional*—The parents are of normal stature and no abnormality is found on examination of the child. Diagnosis is made by elimination.
3. *Delayed puberty*—Delay in onset of puberty may be familial. It is commoner in boys than in girls.
4. *Low birth weight*—(a) Premature infants (b) Intra-uterine growth retardation secondary either to maternal disease or poor intra-uterine environment. These children are marasmic at birth with dry skin and wrinkled facies.
5. *Simple caloric deficiency*—without any other nutritional deficiency.
6. *Endocrine disorders*—
   (a) *Growth hormone deficiency*—Selective deficiency of growth hormone. Body dimensions in proper proportion but stunted. Skin normal and hair distribution appropriate for sex.
   (b) *Hypothyroidism*—Plump but squat and stunted. Thick subcutaneous tissues. Coarse hair. Mental retardation. Typical facies.
7. *Chromosomal abnormality*—Gonadal dysgenesis (Turner's syndrome)—Hypogonadism in females at puberty with sexual underdevelopment, primary amenorrhoea, retardation of growth, webbing of skin of neck, increase in carrying angle at the elbows and osteoporosis. Buccal smear chromatin negative in 80%.

## 18. ATELACTASIS OF LUNG

**Definition**—Atelactasis means a loss of volume in one or more segments or lobes of the lung. It may be obstructive due to occlusion of bronchus to the involved area, or may result from contraction due to chronic inflammation and fibrosis. In general usage the term atelactasis is confined to these two types of volume loss.

**Causes**: of lung collapse—

1. ABSORPTION COLLAPSE—due to bronchial obstruction. (i) *Within lumen*—(a) Plugs of mucus from bronchial secretions, mucus impaction caused by Aspergillus fumigatus (b) Inhalation of foreign bodies, blood or mucopurulent secretions from upper respiratory passages. (ii) *Within the wall*—Adenoma or carcinoma of bronchus. (iii) *Outside the bronchus*—Aneurysm, enlarged glands, neoplasm, inflammatory mass or reticulosis.
2. COMPRESSION COLLAPSE—Pleural effusion, pneumothorax, large neoplasm or rarely cyst in substance of lung with valve-like communication with bronchus.

**Clinical features**—depend on the type and degree of obstruction present:

1. MINOR DEGREE OF OBSTRUCTION—causes little impairment of airflow. Inspiratory or expiratory rhonchi may be heard and recurrent bronchial infection distal to the obstruction may lead to bronchiectasis.
2. MORE MARKED DEGREE OF OBSTRUCTION—e g. *foreign body aspiration. Symptoms*—An asymptomatic interval from minutes to months may follow aspiration of the foreign body. The patient (usually a child) then develops a chronic cough, dyspnoea, often an audible wheeze or stridor, and purulent expectoration. *Signs*—A 'check valve' mechanism may develop in which air passes by the obstruction during inspiration but is trapped during expiration. This leads to localised obstructive emphysema. The trachea and cardiac apex are displaced toward the normal side, and the affected lobe or lung is hyperresonant with diminished breath sounds and inspiratory or expiratory rhonchi on auscultation. With atelactasis or obstructive pneumonitis, the trachea and apical impulse are displaced toward the affected side. The affected hemithorax may appear smaller and has a decreased respiratory excursion and inspiratory intercostal indrawing. Dullness on percussion, decreased fremitus and diminished or absent breath sounds are typical findings Inspiratory rales may be heard over the affected lung.

### Laurence-Moon Biedl Syndrome

Rare familial disorder characterised by obesity, hypogenitalism, diminished body hair, fine-textured skin, dwarfism, polydactylism, retinitis pigmentosa, and mental retardation.

## THE POSTERIOR PITUITARY

### Disorders of Vasopressin Secretion

### I. Diabetes Insipidus

**Definition**—Inability to concentrate urine, large and dilute volumes (rarely less than 3 litres daily) being passed in 24 hours. This may be caused either by deficiency of antidiuretic hormone arginine vasopressin (AVP)—cranial diabetes insipidus; or inability of distal tubules and collecting ducts of nephrons to respond to AVP secreted in normal amounts—(nephrogenic diabetes insipidus).

**Causes:**

I. Cranial Diabetes insipidus (CDI).

1. *Familial*—(a) Dominant or recessive inheritance. (b) Associated with diabetes mellitus, optic atrophy, nerve deafness, atonia of bladder.
2. *Acquired*—(a) Idiopathic.—(b) Tumors: pituitary craniopharyngioma, parasellar meningioma, metastasis. (c) Trauma: Head injury, neurosurgery. (d) Granulomas: Sarcoidosis, histiocytosis (e) Infection: Encephalitis, tuberculosis, syphilis (f) Miscellaneous: Sheehan's syndrome, sickle-cell disease.

II. Nephrogenic diabetes insipidus (NDI).

1. *Familial*—Sex-linked recessive.
2. *Acquired*—(a) Metabolic—Hypercalcemia, hypokalemia. (b) Post-obstructive uropathy—prostatic, urethral (c) Infections—pyelonephritis. (d) Toxic—lithium, demelocycline. (e) Solute excess—glucosuria. (f) Chronic renal disease—polycystic disease, amyloidosis, sickle cell anaemia, sarcoidosis.

**Clinical features:**

1. *Local intracranial or endocrine features*—if associated with intracranial tumors.
2. *Polyuria*—Excessive volumes of colourless urine of low specific gravity.
3. *Polydypsia*—Excessive thirst and resulting disturbance of sleep.

4. *Antibiotics*—To deal with the secondary results of occlusion, including any infection.

## 19. RESPIRATORY FAILURE

**Definition**—Respiratory failure is present if a patient breathing air at sea level has an arterial oxygen tension of less than 8.0 kPa (60 mm Hg). If the hypoxia is combined with a low or normal $PCO_2$ (Less than 6.6 kPa, 50 mm Hg), it is classified as type I respiratory failure If the hypoxemia is associated with $CO_2$ retention ($PCO_2$ more than 6.6 kPa, 50 mm Hg), it is labelled type II respiratory failure.

### Type I respiratory failure

CAUSES—1. Ventilation/perfusion imbalance: chronic bronchitis and emphysema. 2. Venous admixture· (a) Anatomical lesions e g. tetralogy of Fallot. (b) Arterio-venous malformations. (c) Perfusion of alveoli which are not ventilated due to disease such as pneumonia 3 Alveolar capillary block, fibrosing alveolitis.

CLINICAL FEATURES—Central cyanosis.

TREATMENT—High concentration of $O_2$ by mask since there is no danger of $CO_2$ retention in these patients.

### Type II respiratory failure

**Causes:**

1. *Depression of respiratory centre*—Overdosage with depressant drugs, increased intracranial pressure, high concentration of $CO_2$, cerebro-vascular accidents, primary alveolar hypoventilation.
2. *Pulmonary causes*—(i) Restriction of movement of lung —Pleural effusion, pneumothorax. (ii) Intrinsic lung disease—Atelectasis, pneumonia, chronic bronchitis, emphysema, infiltrative diseases, thromboembolism, pulmonary fibrosis, pulmonary oedema.
3. *Mechanical factors*—
   (i) *Thoracic cage defect*: (a) Kyphoscoliosis. (b) Blunt trauma to chest—rib fracture, diaphragmatic rupture. (c) Ankylosing spondylitis.
   (ii) *Neuromuscular disease*—Polio, muscular dystrophy, spinal cord injury, multiple sclerosis, myasthenia gravis, infective polyneuritis.
   (iii) Extreme obesity (Obesity hypoventilation syndrome).

**Clinical Features:** Any combination of the following may be present—

6. *Nephrogenic diabetes insipidus*—is a rare condition in which a congenital defect renders the distal renal tubules refractory to ADH. The disease occurs only in males and is inherited through females. May be due to acquired renal disease since any patient with moderately severe renal disease may have polyuria which does not respond to ADH.
7. *Caffeine idiosyncrasy*—This runs in families. Polyuria ceases if only water is drunk.
8. *Drugs*—besides diuretics which may cause polyuria include antihistamines, carbamazepine, fenfluramine, vitamin D excess, demethylchlortetracycline.

(Also refer to Polyuria in Chapter VII).

**Treatment:**

1. *Replacement therapy*—for moderate to severe CDI. Desmopressin (DDAVP) long-acting synthetic analogue of vasopressin in a dose of 10-20 mcg intranasally 1-2 times daily. Parenteral desmopressin 1-2 mcg daily can be used for post-operative patients.
2. *Agents which stimulate release of vasopressin or potentiate its action*—e.g. chlorpropamide 250-500 mg daily, or carbamazepine 400-800 mg.
3. *Thiazides*—Chlorothiazide 500 mg. or Hydrochlorothiazide 50 mg. twice daily may be helpful in the acquired form of primary NDI.

## II. Essential Hypernatremia

*Causes* : Seen in patients with various types of organic disease affecting pituitary hypothalamic region. *Clinical features*—Sustained hypernatremia, decreased thirst. Some patients show anterior pituitary dysfunction, obesity, hyperlipidemia and episodic muscle weakness. Normal renal function, no signs of hypovolemia and patient can form concentrated urine with dehydration. Vasopressin levels are inappropriately low for the serum osmolality.

## III. Syndrome of Inappropriate Antidiuresis (SIAD)

*Pathogenesis*—Administration of vasopressin and water causes a dilutional hyponatremia in which the patient remains normovolemic but becomes hypotonic and usually has persistent excretion of sodium. Urine osmolality is greater than plasma osmolality. The syndrome of inappropriate antidiuresis is the term used

considered. The aim of ventilator therapy should be to restore arterial pH to between 7.38–7.42 (38 and 42 nmol/litre) irrespective of the resultant level of arterial $PCO_2$

RESPIRATORY FAILURE FROM OTHER CAUSE—such as drug over-dosage, chest injury, infective polyneuritis, etc.—Controlled $O_2$ therapy is seldom adequate and recourse should be made to mechanical ventilation.

## 20. ADULT RESPIRATORY DISTRESS SYNDROME (ARDS)

**Definition**—This is a syndrome of progressive breathlessness and respiratory failure caused by a variety of acute diffuse lung injuries. The term is not applied to patients with cardiogenic pulmonary oedema or to those with pre-existing broncho-pulmonary disease who have acute respiratory failure though they may have marked respiratory distress

*Pathogenesis*—It is postulated that hormonal agents, toxins, components of the coagulation system and neurogenic mechanisms may individually or collectively play a role. Surfactant abnormalities found in ARDS may influence the secondary pathogenesis of the syndrome.

Causes :

1. Shock.
2. Severe non-thoracic trauma.
3. Septicemia.
4. Overdoses of drugs likely to damage pulmonary circulation.
5. Aspiration.
6. Pneumonia bacterial and non-bacterial.
7. Fat embolism.

**Clinical features :** ARDS usually occurs in previously healthy individuals.

*Latent period* between the insult and development of full-blown clinical picture 18-24 hours

*Symptoms*—Tachypnoea, laboured breathing, air hunger and cyanosis.

**Diagnosis :**

1. *Chest X-ray*—Diffuse pulmonary infiltrates characteristically sparing costophrenic angles.
2. *Lung function tests*—(i) $PaO_2 < 50$ mm Hg when concentration of inspired $O_2$ ($F_1\ O_2$) $> 60\%$
   (ii) Total respiratory compliance $< 50$ cc/cm
   (iii) Increased shunt fraction and dead space ventilation.

Third ventricle tumors and cerebral injuries may also produce adiposity by involvement of hypothalamus.

**Management of simple obesity:**

1. EXERCISE—is useful as a supplement to dieting unless there is a medical contraindication.
2. DIET—Rigid dieting is best treatment. 800 to 900 calories per day. It must contain amounts of all essential foodstuffs. Bulkiness of food is important as the patient needs to be satiated. *Foods to be avoided*—bread and anything made with flour, cereals, potatoes and other whole root vegetables, foods containing much sugar, all sweets and salt. Fatty foods like cream, butter, fat. Beans and pork. Fluids not more than 2 pints a day. No restriction of—meat, fish and fowl, all green vegetables, eggs and fruits.

   *Total starvation*—for about 5-10 days prior to more conventional dietary therapy may be justified in selected cases.

SPECIMEN OF LOW CALORIC DIET FOR OBESITY

| *Mixed diet* | *Vegetarian diet* |
|---|---|
| **Morning** | |
| Tea or coffee one cup, with milk 2 tablespoons and sugar one teaspoon | Tea or coffee one cup, with milk 2 tablespoons and sugar one teaspoon |
| **Breakfast** | |
| Eggs 2<br>Toast<br>Orange or grapefruit | Skimmed milk one cup<br>Toast 1 or khakhra 2<br>Sweet lime |
| **Lunch** | |
| Meat soup one cup<br>Boiled fish or roast chicken or mutton<br>Vegetable salad of radish, tomato, cucumber, and lettuce<br>*Bread 1 slice or chappatis 2<br>Apple 1 | Mixed vegetable soup one cup<br>Thin dal 3/4 cup<br>Vegetable salad of radish, tomato, cucumber, and lettuce<br>Cooked pumpkin<br>Bread 1 slice or chappatis 2<br>Apple 1 |

* Chappati (unleavened bread) refers to a thin one made from 15 gm. of wheat flour. A slice of bread refers to a medium slice weighing about 3 gm.

of neck. Artificial pneumothorax sometimes used as diagnostic procedure.

7. *Catamenial pneumothorax*—Recurrent right sided pneumothorax occurring at time of menstruation associated often with pelvic endometriosis.

**Symptoms:** Vary depending on (a) amount of air in the pleural sac, (b) rapidity of its accumulation, (c) condition of the lungs.

1. *Insidious onset*—Vague discomfort in chest, later shortness of breath on exertion. In tuberculous spontaneous pneumothorax the onset is not always sudden as the condition commonly occurs in patients suffering from advanced pulmonary T.B. which has already cut down their normal activities. Patient may complain of more breathlessness or may have chest pain or the pneumothorax may be latent and detected by routine chest examination.
2. *Sudden onset*—Feeling of something snapping in the chest, severe pain, shock, increasing shortness of breath. Blood streaked sputum, cyanosis, restlessness and collapse.
3. *If hydropneumothorax*—Splash of fluid in the chest when he jumps may be the first intimation to the patient.

**Signs:** "Hyper-resonance with silence."

1. CLOSED PNEUMOTHORAX—The opening in the lung is very small and rapidly heals, thus allowing the lung to re-expand.

   *Inspection*—(i) Diminished expansion on affected side. (ii) Bulging on the side of pneumothorax. (iii) Displacement of apex beat towards sound side.

   *Palpation*—(i) T.V.F. absent. (ii) Trachea displaced.

   *Percussion*—(i) Hyperresonance. (ii) If on the left side abolition of cardiac dullness. (iii) Right sided pneumothorax reduces upper level of liver dullness.

   *Auscultation*—(i) Breath sounds diminished or absent Bronchial breath sounds described as metallic or amphoric may be heard. (ii) Crunching sound—In left-sided pneumothorax there may be 'crunch' over the heart if air is also present in mediastinum (Hamman's sign). (iii) Click —A shallow left pneumothorax may produce a sound synchronous with the heart beat.
2. OPEN PNEUMOTHORAX—The opening remains patent and the pressure in the pleural space remains equal to that of the atmosphere. Signs same as above plus—(i) Cracked

## 3. THYROID GLAND

### Hyperthyroidism

**Definition**—A clinical condition resulting from increased levels of free $T_4$ and/or $T_3$. It is usually due to a disorder of the thyroid gland but can be induced by administration of excessive amounts of thyroidal hormones.

**Varieties of hyperthyroidism :**

1. Grave's disease.
2. Nodular goitre—(a) Multinodular. (b) Solitary toxic adenoma.
3. Excessive TSH—(a) Pituitary tumour. (b) Trophoblastic tumors (choriocarcinoma, hydatidiform mole).
4. Excessive thyroid hormone—(a) Ingestion of thyroid hormone. (b) Metastatic thyroid carcinoma. (c) Struma ovari. (d) Thyroiditis. (e) After thyroid irradiation.
5. Exogenous iodide—(Jod-Basedow).

**Grave's Disease**

**Etiology :**

1. *Sex*—much more common in females. (6 : 1).
2. *Age*—majority in young adults.
3. *Hereditary and thyroid diathesis*—Tendency for disease to occur in families.
4. *Environment and psychogenic factors*—emotional stresses causing over-stimulation of sympathetic.
5. *Previous formation of nodular goitre*—in case of secondary hyperthyroidism.
6. *Miscellaneous*—Administration of iodide or a preceding infection with micro-organisms (e.g., Yersinia enterocolitica) is occasionally a trigger.

Excessive amount of thyroid hormones is due to abnormal stimulation of the thyroid by circulating immunoglobulins. These have been shown to bind at or near to the thyroid stimulating hormone (TSH) receptor on the thyroid follicular cell, to induce activation of adenyl cyclase and in consequence to activate subsequent steps in the biosynthesis and release of thyroid hormone.

Currently it is considered that Grave's disease is due to a genetically determined disorder of immunological stability which allows B lymphocytes to proliferate and secrete these

*X-ray*—Air collection seen as translucent area. Mediastinal displacement with collapsed lung near spine In extreme cases the mediastinum is grossly displaced to the opposite side with pockets of air appearing to reach the other side (pleural herniation).

**Differential Diagnosis:**

**1. Of common types of pneumothorax:**

| *Benign spontaneous pneumothorax* | *Tuberculous pneumothorax* |
|---|---|
| No family history of tuberculosis | Family history of tuberculosis may be obtained |
| Fever usually absent | Pyrexia common |
| No loss of weight | Weight loss common |
| No sweats | Night sweats frequent |
| Other lung normal | Other lung may show signs of tubercle |
| Fluid accumulation minimal or absent | Fair amount of fluid may accumulate |
| No adhesions | Adhesions frequently present |

**2 Of causes of resonant note with diminished breath sounds:**

| (1) *Pneumothorax* | (2) *Large pulmonary cavity* |
|---|---|
| Acute onset with pain in chest. | Insidious onset. |
| Absence of movements of chest on affected side. | Restriction of movements at apex only. |
| Bulging of interspaces. | Retraction of interspaces. |
| T.V.F. diminished or absent | Increased T.V.F. |
| Cracked pot sound rare. | Cracked pot sound usual if cavity superficial. |
| Succussion splash may be present | No succussion splash. |
| Breath sounds absent. | Cavernous or amphoric breath sounds. |
| Bell tympany constant. | Bell tympany rare. |

3. *Emphysematous bulla of large size*—Symptoms of chronic bronchitis. Transient rales on auscultation. X-ray—Fine lines in shape of crescents and semicircles. The circumscribed lung is hyperilluminated and adjacent tissue condensed. No intrathoracic displacements.

8. *Connective tissue and bones*—Subacromial bursitis or tendinitis, or bursitis of shoulder joint.
9. *Sex function*—In severe cases oilgomenorrhoea or amenorrhoea. Rarely menorrhagia. Relative impotence in male.
10. *Localised myxoedema*—Usually pretibial, raised, non-tender, thickened, bluish-red infiltration of the skin.
11. *Other features*—Pigmentation usually confined to orbital regions, rarely diffuse. Profuse perspiration. Premature whitening of hair. Thyroid acropachy resembling clubbing of fingers.
12. *Muscular disorders associated with thyrotoxicosis*—
    (a) Exophthalmic ophthalmoplegia (malignant exophthalmos)—progressive exophthalmos associated with ophthalmoplegia in one or both eyes.
    (b) Acute thyrotoxic myopathy—rapidly developing bulbar palsy and generalised weakness of limbs.
    (c) Chronic thyrotoxic myopathy—Symmetrical muscular weakness and wasting limited to muscles of trunk and limbs.
    (d) Thyrotoxic periodic paralysis.
    (e) Myasthenia gravis may be rarely associated with thyrotoxicosis.

THYROID CRISIS—(*Thyroid storm*)—An acute exacerbation of all symptoms occurring spontaneously or precipitated by infection or after thyroidectomy in an unprepared patient. Manifestations may be predominantly (a) Cardiac—marked tachycardia. (b) Cerebral—acute mania, delusions, delirium. (c) Gastro-intestinal—diarrhoea and vomiting or abdominal pain simulating acute abdomen. (d) Comatose—unconsciousness or inability to speak or move Eventually collapse and death may occur.

**Diagnosis:**

**I Confirmation of hyperthyroidism—**

1. T4, TBG AND FREE T4 INDEX—Measurement of serum T4 (Normal 50-100 nmol/l or 40-110 μg/l) is the most popular front line test. But T4 concentration is influenced to a great extent by concentration of its binding proteins especially thyroxine-binding globulin (TBG). Hence total T4 concentration will vary with concentration of TBG. Since about 99 96% of T4 is bound to protein, simple assay of total serum T4 will suffice to give T4 binding protein (T4

small pneumothorax and air has to be removed. Antituberculous therapy if evidence of tubercle. Analgesics if pain.

2. *Pleural drainage*—If large pneumothorax or tension pneumothorax. After local anaesthesia, a 2 inch long needle, or preferably a self-retaining catheter or intercostal catheter stretched over a sharp trocar (after initial incision) is inserted in the 2nd interspace in the midclavicular line, or 4th or 5th interspace just behind the anterior axillary line (where the chest wall is thin and the tube can cause less discomfort). The tube is then connected to an underwater seal. Air bubbles come out at each expiration or cough. If there is no further bubbling for 24 hours and the chest x-ray shows complete re-expansion of the lung (usually after 3 to 4 days) the tube can be removed.

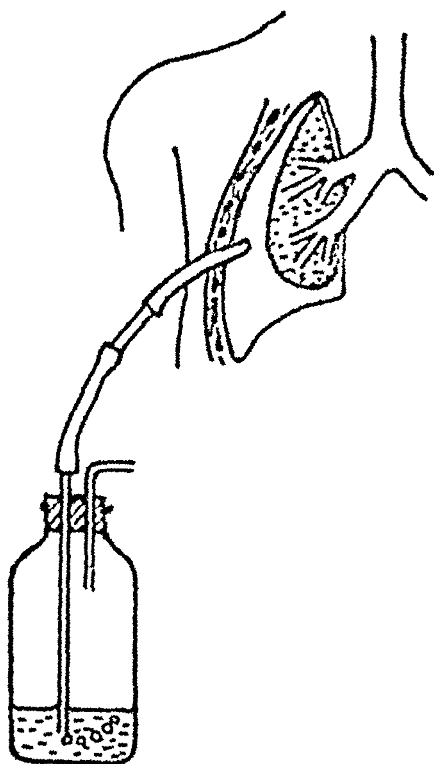


Fig. 3.2 Underwater-seal drainage of pneumothorax. Air bubbles leak out at each inspiration or cough, and if the lung perforation had sealed, bubbles soon stop.

**B. Surgical treatment—**

*Indications*—1. Bilateral pneumothorax. 2. Hemopneumothorax. 3. Failure of medical treatment—air continues to leak inspite of continued pleural drainage. 4. Recurrent pneumo-

II. **Determination of the cause of hyperthyroidism—**

THYROID SCAN—for (a) Differentiating between a diffuse and nodular goitre. (b) Metastatic thyroid carcinoma or struma ovari may also be diagnosed by scanning in appropriate areas. (c) Hyperthyroidism due to excessive ingestion of thyroid hormone by a high serum T4 associated with suppressed uptake of radioisotope by the thyroid.

**Differential Diagnosis:**

1. *Of Grave's disease and toxic nodular goitre:*

| | *Grave's disease* | *Toxic nodular goitre* |
|---|---|---|
| *Age* | Younger | Older |
| *Gland* | Smooth, diffuse enlargement | Nodular, irregular |
| *Eye signs* | Common | Rare |
| *Cardiac involvement* | Uncommon | Common |
| *Pressure symptoms* | Uncommon | Common |
| *Autoimmune disease* | Common | Uncommon |

2. *Of other clinical conditions—*
   (a) *Anxiety states*—Psychic, emotional or personality change predominates. Weight loss due to poor appetite, in contrast to good appetite in hyperthyroidism. Hands cold and clammy rather than hot and sweaty. Symptoms generally exaggerated and bizzare.
   (b) *Nutritional deficiency*—Weight loss, anorexia, manifestations of vitamin deficiency simulating pulmonary tuberculosis or malignant wasting.
   (c) *Cardiac disease*—Symptoms of heart disease like atrial fibrillation, angina pectoris, or of effort syndrome, or heart failure refractory to digitalis.
   (d) *Chronic alcoholism*—may simulate but tremor is coarse and laboratory data normal.
   (e) *Emphysema and asthma*—may mimic because of prominence of eyes, weight loss, tachycardia, and sweating.
   (f) *Diabetes mellitus*—may be simulated because of loss of weight in spite of increased appetite and non-diabetic glycosuria.
   (g) *Clinical picture of muscular and neuromuscular dystrophies.*

2. Pleuritic rub—Crackling quality, heard during both inspiration and expiration, localised usually to a small area of chest wall, and often better heard on increasing the pressure of the stethoscope.

**Management:**

1. Rest in bed.
2. Relief of pain with—(a) counter-irritants—kaolin poultice, (b) hot water bottle, (c) splinting of chest with strapping, (d) analgesics and sedatives.
3. Relief of cough—Codein preparations.
4. Specific treatment—according to cause of pleurisy.

**Classification of Pleural Fluids:**

| *Nature of fluid* | *Causes* |
|---|---|
| 1. **Serous—** | |
| (a) TRANSUDATE<br>(*Hydrothorax*)<br>Pale yellow<br>Sp gr. 1008-1012<br>Proteins less than 3 gm<br>Does not clot<br>Cells — few endothelial or none<br>Fluid LDH $<$ 200 IU | 1 Congestive cardiac failure.<br>2 Hypoproteinemia, cirrhosis, nephrosis<br>3. Constrictive pericarditis.<br>4. Thrombosis of azygos vein or IVC obstruction.<br>5 Meig's syndrome<br>6. Myxoedema.<br>7 Peritoneal dialysis |
| (b) EXUDATE<br>(*Effusion*)<br>Yellow to brown<br>Sp. gr. 1016 or more<br>Proteins more than 3 gm.<br>Clots spontaneously<br>Fluid LDH level $>$ 200 IU<br>Cells<br>*Many lymphocytes*:<br>Tuberculosis, fungal disease, carcinoma, myxoedema, resolving pneumonia<br>*Many polymorphs*:<br>Pulmonary infarction, acute bacterial pneumonia, rheumatic fever, Coxsackie virus infection, lung abscess, amoebic hepatitis or abscess or subdiaphragmatic abscess, carcinoma | 1. Tuberculosis<br>2. Extension of inflammation from lungs — pneumonia, malignancy, infarction, abscess, bronchiectasis, fungal infection.<br>3. Extrapulmonary but thoracic — trauma to chest wall, pneumothorax, post myocardial infarction syndrome, acute idiopathic pericarditis, tuberculous osteitis of rib.<br>4 Subphrenic infection — amoebic liver abscess, subphrenic abscess, acute pancreatitis, acute appendicitis, perforated peptic ulcer, cholecystitis, malignant neoplasms of stomach or colon<br>5 Neoplasms—Primary: benign or malignant mesothelioma. Secondary: bronchogenic carcinoma, carcinoma of breast, lymphomas<br>6 Systemic diseases—(a) Collagen diseases—Acute rheumatic fever, lupus |

*Disadvantages*—(i) Greater risk to the patient. (ii) Expense of hospitalisation. (iii) Interference with patient's work for a considerable time. (iv) Complications like laryngeal paralysis, tetany and hypothyroidism. (v) Thyroid crisis.

Preparation for surgery—All cases should first be rendered euthyroid by 6-8 weeks course of carbimazole over-lapped by course of Lugol's iodine, or potassium iodide 0.1 gm. daily, to reduce vascularity of the gland.

3. **Radioactive iodine**—

*Indications*—(i) In patients over the age of 40 it is the treatment of choice. (ii) Toxicity recurring after previous subtotal thyroidectomy. (iii) Very nervous patients who fear surgery. (iv) Patients with severe thyrotoxic heart disease or other debilitating conditions. (v) Young patients who have relapsed following antithyroid drugs or who have shown sensitivity reactions to them.

*Contraindications*—(i) Patients under 45 years of age because of high incidence of hypothyroidism (except recurrence of thyrotoxicosis after subtotal thyroidectomy or severe cardiac or other associated disease). (ii) During pregnancy and in nursing mother because foetal thyroid gland and that of the breast-fed child will take up the isotope.

*Advantages*—(i) Simple procedure. (ii) Patient may be ambulant. (iii) Usually no radiation sickness or initial swelling of the thyroid gland. (iv) No skin changes. (v) Successful in almost all cases. (vi) Cheap (vii) Useful in unco-operative patients and those with extremely large goitres. (viii) Also useful when serious toxic reactions have followed therapy with other compounds. (ix) No mortality.

*Disadvantages*—(i) Difficulty of gauging the correct dosage resulting in high incidence of hypothyroidism. (ii) Optimum benefit does not take place until about 3 months. (iii) Difficulties of administration—Treatment must be given by trained personnel, and special precaution must be used to protect workers from the radioactive material.

*Dose*—Single oral dose of 4-8 millicuries usually sufficient. A second dose may be given after 3-4 months. To reduce incidence of hypothyroidism, dose of radioactive iodine can be reduced and antithyroid drug therapy given after radiation to provide temporary control while radiation exerts its effect.

*Complications*—(i) Myxoedema. (ii) Rarely acute thyroiditis, slight exacerbation of thyrotoxic state during the week fol-

| Nature of fluid | Causes |
|---|---|
| mg /100 ml of fluid Many large fat globules | 3. Tuberculosis. 4 Parasitic infection—filaria. 5 Thrombosis of left subclavian vein Carcinoma or tuberculosis of lung or pleura. |
| (b) Chyliform—Fat but not derived from thoracic duct but from degenerated cells. Globules smaller | |
| (c) Pseudo-chylous — Milky appearance not due to fat but lecithin, globulin and calcium phosphate | Chronic effusions due to heart disease, nephritis, tuberculosis and malignancy. |
| (d) Cholesterol effusion — Peculiar opalescent glistening appearance due to presence of cholesterol crystals | Long standing effusion — tuberculosis, carcinoma, nephrotic syndrome. |

## Pleural Effusion

**Definition**—Pleural effusion is an abnormal accumulation of fluid in the pleural space as a result of excessive transudation or exudation from pleural surfaces.

**Causes**—See causes of exudate (table).

*Relation of tuberculosis to primary pleural effusion*—Evidence for most cases of pleural effusion being tuberculous—(i) Tuberculosis often present in lung. May be detected after aspiration of fluid. (ii) Tubercle bacilli may be found in sputum. (iii) Effusion cytologically resembles tuberculous fluid (small lymphocytes). (iv) Effusion fluid may give cultures of tubercle bacilli or on injection cause tuberculosis in guinea pigs. (v) Tuberculosis subsequently develops in about 20% in 5-10 years. (vi) Mantoux test positive after 8 weeks in tuberculous effusion. (vii) Tuberculous lesion found post-mortem in accidental deaths.

**Symptoms:**

*Onset*—(i) Acute with attack of pleuritic pain or pyrexia of unknown origin, later with pain. (ii) Subacute. (iii) Insidious —with ill-defined health followed by dyspnoea.

1. Pain—in early stages due to dry pleurisy replaced by dull ache.
2. Dyspnoea—depends on rate of collection of fluid.
3. Cough usually dry.
4. Loss of weight.
5. Symptoms of toxemia—Malaise, fever, anorexia.

which is characterised by deposition of mucinous material causing swelling of skin and of subcutaneous tissues.

**Etiology:**

A. PREDISPOSING CAUSES—
- (a) Hereditary or genetic or constitutional factors occasionally.
- (b) Goitrous regions (Prolonged iodine deficiency).
- (c) Females (6 to 1).
- (d) Age—usually after 35.

B. DIRECT CAUSES—
1. *Primary thyroidal causes*:
   - (a) Inhibition of synthesis of thyroid hormones: (i) Iodine deficiency. (ii) Antithyroid drugs. (iii) Inherited enzyme defects.
   - (b) Destruction of gland: (i) Autoimmune thyroiditis (Hashimoto's). (ii) Thyroidectomy. (iii) Irradiation (radioactive iodine, external). (iv) After thyroiditis (acute, subacute). (v) Replacement by cancer.
   - (c) Agenesis.
   - (d) Idiopathic atrophy (related to Hashimoto's).
2. *Secondary to pituitary/hypothalamic disease*: Rare.

**Clinical features:**

*Onset*—Insidious with physical, mental and metabolic processes below normal.

1. *Skin and subcutaneous tissues*—Skin usually coarse, dry, cold and yellow, due to deposit of carotene, puffiness of face, baggy eyelids, falling of hair on head and outer third of eye-brows. Swollen oedematous appearance of supraclavicular regions, neck, backs of hands and feet. Minimal sweating.
2. *Cardio-vascular*—Anginal pain, bradycardia, cardiac enlargement.
3. *Psychiatric features*—Mental changes vary from slowness of cerebration to myxoedema madness.
4. *Neurological*—(a) Carpal tunnel syndrome. (b) Polyneuritis. (c) Cerebellar syndrome with slurred speech and ataxia. (d) Muscle cramps and stiffness. (e) Myopathy and myotonia. (f) Deafness of perceptive type. (g) Delayed relaxation phase of ankle jerk reflex.

wards the lung on PA film. Smaller effusions can be detected if radiograph is taken with patient in lateral decubitus position. Views taken in this position are also useful when a subpulmonary collection of fluid mimics an elevated dome of the diaphragm.

2. *Examination of pleural fluid*—
   (a) *Cytology*—It is important to note the types of cell present and their relative preponderance (see table).
   (b) *Biochemical analysis*—(i) Protein concentration: Exudate > 30 gm/litre, transudate < 30 gm/litre. (ii) LDH elevated in tuberculous effusion. (iii) Glucose concentration below 30 mg/100 ml (1.7 mmol/1) is usual in rheumatoid pleural effusions, but is also found in malignant effusion and in empyema. (iv) Amylase high in effusion associated with pancreatitis. (v) Fat content high in chylous effusion.
   (c) *Bacteriology*—(i) Culture for pathogenic bacteria. (ii) Guinea pig inoculation if tuberculosis is suspected.
   (d) *Other investigations*—according to etiological factor
3. *Pleural biopsy*—if careful examination of pleural fluid fails to establish an etiological diagnosis. It can be made through the same puncture site as fluid aspiration, while there is still some fluid remaining. An Abrams biopsy punch is used. (Vim Silverman or Menghini needle can also be used). A small stab wound is first made in the skin to aid penetration of the needle. Once it is in position, a syringe is attached, the side notch of the punch is opened and a little pleural fluid is drawn into the syringe. The punch is angled so that the side with the notch forms an acute angle with the skin and it is held in line with the intercostal space. The punch is then slowly withdrawn whilst applying light pressure in the direction of the open notch so that this catches on the parietal pleura. A slight resistance denotes that this has happened and the punch is then briskly closed, thus cutting the pleural biopsy sample which is retrieved from the needle after withdrawal.



Fig. 2.3 Abrams pleural biopsy punch.

7. *Thyroid antibodies*—50 per cent of patients with primary hypothyroidism show elevated anti-thyroglobulin titres.

**Treatment:** Most satisfactory endocrine therapy.

1. REPLACEMENT THERAPY—
   (a) *L-thyroxine*—is the treatment of choice. In patients over age of 50 initial dose should not exceed 0 05 mg. daily, increasing the dose every 4 weeks by 0 05 mg./day until patient is euthyroid. The optimal maintenance dose varies between 0.1–0 2 mg. of thyroxine daily. Caution must be exercised in any patient with ischemic heart disease in whom it may be difficult to attain full replacement dosage because of angina pectoris.
   (b) *Triiodothyronine*—action more rapid in onset but of shorter duration. Average daily maintenance dose 40-60 mcg. More useful for situations in which rapid correction of hypothyroidism is desirable, e.g., preceding surgery and for myxoedema psychosis.

2. MYXOEDEMA COMA—(a) Keep patient in warmed bed or warm room. (b) L-thyronine 400-500 mcg. by intragastric tube or IV bolus. (c) IV fluids. (d) Oxygen. (e) Tracheostomy and assisted respiration may be necessary. (f) Treatment of infection, cardiac failure or arrhythmia.

**Juvenile myxoedema**—Commences in childhood. Symptoms same as adult myxoedema, but also deficient growth, delay in appearance of centres of ossification, delayed sexual maturity and mental deficiency. Pallor. Dental age delayed Treatment—Replacement therapy with 3.5-5 $\mu$g/kg body wt/day.

**Cretinism**—Hypothyroid state occurring before birth or in infancy. May be endemic and associated with goitre, or sporadic with thyroid aplasia or congenital absence of thyroid tissue (athyreotic). Clinical features—Imbecility and apathy, defective speech, dwarfism, flaccidity of muscles with protuberant abdomen, large tongue, adipose deposits, spade-like hands and feet, thick lips, constipation, retarded bone age. In neonatal hypothyroidism baby is placid, lethargic and seldom crying.

## 4. THE PARATHYROIDS

### Tetany

**Causes**—

I. HYPOCALCEMIA—
   1. *Hypoparathyroidism*—(a) Idiopathic. (b) Pseudohypoparathyroidism. (c) Post-thyroidectomy.

| *Pneumonia* | *Pleural effusion* |
|---|---|
| Crackles always present. | Crackles rarely heard. |
| Bronchophony over area of consolidation. | Aegophony at upper level of fluid. |
| Leucocytosis marked. | Leucocytosis absent or moderate. |

6. *Fibrosis of lung*—Retraction of intercostal spaces, heart or trachea shifted to side of lesion. V.R. diminished. No stony dullness. Non-homogenous opacity on X-ray.
7. *Massive collapse of lung*—Mediastinum drawn to same side. V.R. increased. Evidence of cause of collapse, e g., mediastinal growth, etc. X-ray—homogenous opacity.
8 *Bronchial carcinoma*—when extending to periphery gives similar signs or may be associated with pleural effusion Haemoptysis, presence of pressure symptoms, progressive emaciation and cachexia. X-ray—shadow of growth or collapse of segment, lobe or lung.
9 *Large pericardial effusion*—Heart not displaced to right, area of dullness most marked in axillary region, normal pulmonary resonance at back. Heart sounds muffled or not heard.
10. *Mesothelioma of pleura*—Large mass of solid tissue obliterating pleural space. Associated with pleural effusion which is haemorrhagic, shows large endothelial cells and requires repeated tapping.
11 *Cardiac enlargement*—No dullness at base of lung, marked pulsation in epigastrium, apex beat in axilla. Evidence of cause, e g aortic regurgitation, etc.
12 *Hydatid cyst of lung*—If large, signs of effusion usually at base with sometimes displacement of mediastinum. Cough and progressive dyspnoea common. X-ray shows shadow with well defined margins. Eosinophilia common. Positive Casoni test.

II. **Conditions below the Diaphragm**—

13. *Subphrenic abscess*—History of appendicitis, abdominal operation or biliary infection. Broad zone of hyperresonance just above the dull area. Fever with rigors, some pain in upper abdomen and rigidity in epigastrium. Screening—immobility of half diaphragm.
14. *Liver abscess*—may push the diaphragm and lower border of pleura up and give signs of effusion. History suggestive of liver disease. No moveable dullness. Compression tenderness present.

2. *Chvostek's sign*—Contraction of facial muscles by tapping over the facial nerve in front of the lobe of the ear.
3. *Erb's sign*—The muscles show increased excitability to galvanic stimulation.

Laboratory tests—See table below:

| | Ca | P | Alkaline phosphatase | Other features |
|---|---|---|---|---|
| Hypoparathyroidism (any cause) | ↓ | ↑ | N | History of surgery, Typical facies, etc |
| Vit D deficiency | N or ↓ | ↓ | ↑ | Diet deficient |
| Renal tubular acidosis | N or ↓ | ↓ | ↑ | Abnormal acid load test |
| Steatorrhoea | N or ↓ | ↓ | ↑ | High faecal fat |
| Renal failure | ↓ | ↑ | ↑ | High BUN. |
| Hyperventilation | N | N | N | History |

## Hypoparathyroidism

**Clinical Features:**

1. *Ectodermal changes*—Nails become brittle and ridged and may fall off. Permanent teeth hypoplastic and transversely ridged if disease commences before tenth year. Vesicular or eczematous eruptions may occur on skin. Fissures at angles of mouth. Hair tend to become dry and sparse. Cataracts common. Systemic moniliasis.
2. *Mental symptoms*—Varying from minor disturbances to major psychoses. Electroencephalographic abnormalities may precede development of epilepsy and psychological symptoms.
3. *Diagnostic changes in serum Ca, P and alkaline phosphatase.*
4. *Raised intracranial tension and papilloedema*—may occur, return to normal with correction of hypocalcemia.
5. *Intracranial calcification*—seen on X-ray in region of basal ganglia as symmetrical punctate opacities.
6. *E C.G.*—QT interval prolonged.

**Treatment:**

ACUTE TETANY—10 to 20 ml. 10% calcium gluconate I.V.

TREATMENT OF HYPOPARATHYROIDISM—to prevent recurrence of tetany.

1. *Calcium*—gluconate or lactate, or dibasic calcium phosphate.

syringe with a two-way stop cork. As a rule not more than 800 to 1000 ml. of the fluid should be removed at one time. Aspiration should be discontinued if patient begins to cough or complains of tightness in the chest. After aspiration the needle is removed and the puncture wound sealed with collodion. If necessary aspiration may be repeated after 2 or 3 days.

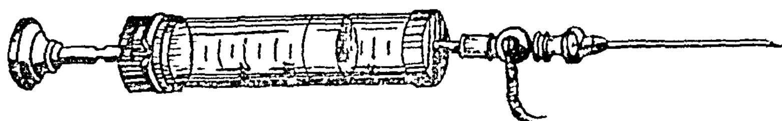


Fig 3 4 Two-way syringe with needle used for pleural aspiration

COMPLICATIONS—

1. *High negative intrapleural pressure*—The lung is unable to expand fully as indicated by increased pull on the syringe plunger. Patient feels tightness in the chest accompanied by coughing. This can be reduced by allowing some air to be sucked into the pleural space.
2. *Pleural shock*—due to vagal inhibition. The patient's head should be placed low and injection of adrenaline or nikethamide given and oxygen started.
3. *Air embolism*—(a) If the aspiration needle tears the pleura and a superficial vein, air can be sucked into the pulmonary venous system through the needle itself or adjacent lung alveoli. (b) Air may enter the coronary arteries causing cardiac arrest (c) More often air goes to the cerebral arteries and produces transient neurological symptoms and signs. Emergency treatment is to tilt the patient's head down with his right side uppermost to discourage air from entering these vessels.
4. *Pulmonary oedema*—If the fluid is removed too quickly, oedema may develop in the re-expanded lung tissue. Treatment is reduction of intrapleural pressure by allowing some air to be sucked into the pleural space.
5. *Circulatory collapse*—due to non-expansion of lung from pleural fibrosis causing high negative intrapleural pressure interfering with venous filling.
6. *Rupture of intercostal vessel*—rare.
7. *Pneumothorax or haemoptysis*—if lung is punctured.
8. *Empyema*—due to introduction of infection into the pleural space.

IV *Corticosteroids*—can help to achieve a more rapid absorption of the fluid thus reducing the risk of pleural thickening

2. *Onset*—(i) Usually gradual. Increasing asthenia, bone pains or swelling of bone. (ii) Rarely sudden, e.g., fracture or renal colic.
3. *Hypercalcemia symptoms*—Muscular weakness, constipation, loss of weight, anorexia, nausea and sometimes vomiting, malaise.
4. *Renal manifestations*—
   (a) Due to chemical changes in urine—polydipsia and polyuria.
   (b) Due to formation of renal calculi most common manifestation of hyperparathyroidism—hematuria and renal colic.
   (c) Due to production of parenchymatous renal disease—chronic nephritis, hypertension.
5. *Bony manifestations*—Decalcification and bending of bones. diffuse osteitis fibrosa cystica, fractures, deformities of jaw and falling of teeth.
6 *Metastatic calcification*—Calcareous deposits in pericardium, myocardium or lungs may produce dyspnoea and tachycardia, and in the muscles pain and tenderness Corneal calcification may occur.
7. *Gastrointestinal features*—Peptic ulceration is common. Constipation. Pancreatitis may occur as a complication.

**Diagnosis:**

1. *Plasma*—

| *Serum* | *Normal* | *Hyperparathyroidism* |
|---|---|---|
| (a) Calcium .. | { Total 9-11 mg.<br>Ionized 5.9-6.5 mg. | More than 11 mg.<br>6 7-9.5 mg. |
| (b) Phosphorus . | 2 5-4.5 mg. | Lowered or Normal |
| (c) Alkaline phosphatase ... | Females: 5 6 ± 1 8 units<br>Males : 7 6 ± 1.9 units | About 20 units (if associated active bone disease) |
| (d) PTH .. | < 1ng/ml | Raised |

2. *Urinary calcium*—increased in primary and tertiary hyperparathyroidism, low in untreated secondary hyperparathyroidism.
3. *X-ray*—(a) *Bones*—(i) Cortical erosions—particularly along radial aspect of middle phalanges of the fingers and

age to a water seal may be necessary if fluid reaccumulates very rapidly.

2. *Antibiotics*—Penicillin 1 million units 6-hourly IM. Also intrapleurally 500,000 units at each inspiration in 5 to 10 ml. of normal saline. If organism insensitive to penicillin other suitable antibiotic.
3. *Intercostal drainage*—if no definite improvement after about 10 days and in severely ill children.
4. *Breathing exercises*—as soon as signs of general toxicity disappear.

### Chronic empyema

**Definition**—Empyema of more than 3 months duration is considered chronic.

**Causes:**

1. *Ineffective drainage*—or failure to diagnose acute empyema.
2. *Chronic infection*—Tuberculosis, lung abscess, bronchiectasis, actinomycosis.
3. *Carcinoma lung*—with pleural involvement.
4. *Bronchopleural fistula*—due to lung abscess, lung trauma or rupture of infected lung cyst.
5. *Foreign body*—in pleural cavity, e.g., drainage tube, rib sequestrum.
6. Inadequate drainage of subphrenic abscess.

**Symptoms and Signs**—Recurrent symptoms of chest pain and fever. Loss of weight and anaemia. Clubbing of fingers. Chest wall deformity from fibrosis. Chronic sinus tracts into the skin or lungs may develop. When bronchopleural fistula is present, air can be heard (or felt) blowing through a patent sinus during coughing.

*X-ray*—Dense pleural opacity, crowding of ribs and elevation of diaphragm on affected side.

*Methylene blue test*—Bronchopleural fistula can be demonstrated by injecting 2 ml. of 1% methylene blue into the empyema and examining the sputum for the dye.

**Management**—Intercostal drainage with instillation of appropriate antibiotics, or rib resection and open drainage. When this fails, thoracotomy with excision of empyema sac, allowing the lung to re-expand and obliterate the dead space.

pelvis, femurs, and tibiae. (f) *Multiple myeloma*—General decalcification with punched out areas, Bence Jones proteinuria. Myeloma cells in bone marrow. (g) *Metastases*—Patchy distribution, presence of primary growth.

**Treatment**—(1) SURGICAL: Removal of parathyroid adenoma. All patients should be followed with yearly biochemistry, since a few may develop the disease in gland previously appearing normal.

(2) MEDICAL—*Indications*: (a) Mild form of the disease. (b) Failed parathyroidectomy. (c) Patient unfit for surgery. (d) With severe bone disease before parathyroidectomy. (e) With severe hypercalcemia before diagnosis is established.

*Emergency treatment of severe hypercalcemia*—(a) IV fluid replacement—5-10 litres of normal saline. (b) Parenteral phosphate—60 mmol in saline over 4-6 hours (not to be used in patients with renal impairment). (c) Calcitonin—may be of use in malignant hypercalcemia. (d) Corticosteroids—Prednisolone 30 mg/day can be given at start. (e) Peritoneal or hemodialysis—using low calcium exchange fluids particularly effective in patients with suspect renal function. (f) Mithramycin—can be used to lower calcium in dose of 15 mg/kg. May cause bleeding diathesis.

*For renal stone formation*—High fluid intake and small dose of acid to lower urinary pH.

*For excessive bone resorption in postmenopausal women*—Oral oestrogens or progesterones.

*For severe bone disease*—Vitamin D.

## 5. THE ADRENALS

### ADRENOCORTICAL HYPOFUNCTION

#### Acute adrenocortical insufficiency

*Causes*—May occur in—(a) Adrenalectomized patients. (b) Patients with Addison's disease with inadequate substitution therapy especially with vomiting, diarrhoea, surgical operation, parturition or intercurrent infection. (c) Rarely with meningococcal septicemia (Waterhouse-Friderichsen syndrome).

*Symptoms and signs*—Sudden onset with fall of blood pressure, cold and cyanosed extremities, nausea, vomiting and diarrhoea, stupor and terminal coma.

*Management*—Hydrocortisone sodium succinate 100-200 mg. IV at once and then every 8 hours with glucose-saline infusion.

# 4. The Haemopoietic System

## 1. ANAEMIAS

**Classification :**

**I According to cause—**

1. BLOOD LOSS—Acute or chronic post-haemorrhagic anaemia.
2. IMPAIRED RED CELL FORMATION—
   (1) *Genetic disorders of haemoglobin synthesis*—Thalassemia syndromes.
   (2) *Acquired deficiency of substances essential for haemopoiesis*—(i) Iron deficiency anaemia. (ii) Megaloblastic anaemia due to deficiency of vitamin $B_{12}$ or folic acid (iii) Protein malnutrition
   (3) *Disturbances of erythropoiesis not due to deficiency states or genetic causes*—(a) Secondary anaemias—due to infection and/or inflammatory disorders; renal or hepatic failure; metastatic malignant disease. (b) Aplastic anaemia. (c) Drug-induced disorders of erythropoiesis. (d) Infiltrative disorders of bone marrow—acute and chronic leukaemia, malignant lymphoma, multiple myeloma, metastatic carcinoma, myelosclerosis. (e) Refractory sideroblastic anaemia. (e) Endocrine deficiencies—Myxoedema, panhypopituitarism.

**II. According to size of red cells and their haemoglobin content (Morphological)—**

1. *Normocytic*—Average cell volume (MCV) within normal range and mostly normal average cell haemoglobin concentration (MCHC).
2. *Hypochromic microcytic*—MCV reduced, MCHC reduced
3. *Normochromic microcytic*—MCV reduced, but MCHC normal
4. *Macrocytic*—MCV increased. Mostly normochromic.

**III Hemolytic anaemias—Inherited or acquired—**

(a) Intrinsic (erythrocytic defects). (b) Extrinsic (extra-erythrocytic) mechanisms.

**Investigation of a case of Anaemia :**

**I History—**

*Age and sex*—Prematurity in infants. Females during reproductive period of life. G6PD deficiency confined to males. Sideroblastic anaemia mostly in males.

1. *Pigmentation of skin and mucous membranes*—
   Varieties—(a) Bluish black discolouration, or brownish patches or streaks on lips, gums, inside of cheeks and posterior aspect of the palate almost pathognomonic. Rectal and vaginal surfaces also involved. (b) A diffuse tan over the non-exposed as well as exposed portions of the body. (c) Hyperpigmentation of extensor surfaces, pressure points and scars, e.g. face, neck, dorsum of hands and forearms, waist line, knuckles and ankles Palms and soles escape pigmentation except for the creases at the interphalangeal joints. (d) Multiple black freckles especially on the forehead, face, neck, shoulders and arms. (e) Areas of vitiligo or leukodermic type of pigmentation.
2. *Gastro-intestinal disorders*—Anorexia, often with nausea and vomiting. Constipation with intermittent diarrhoea. Hypo- or achlorhydria. Abdominal pain. Irritation of the diaphragm by tuberculous adrenal may produce shoulder pain.
3. *Cardio-vascular system*—Postural hypotension. Faintness may result on assuming erect position. Sometimes dyspnoea. Heart sounds feeble.
4. *Muscular system*—Muscular weakness, and wasting with creatinuria. Sometimes cramps in muscles.
5. *Mental and Nervous*—Asthenia is invariable and the first symptom to appear in majority of cases. Loss of memory, drowsiness. Sometimes periods of restlessness, irritability and insomnia. Negativism and pessimism in chronic cases.
6. *Genital system*—Impotence and amenorrhoea. Symptoms may be aggravated at the time of menstruation or menopause.
7. *Renal system*—In a crisis, and to a less extent in subacute phases of the disease, renal function is severly impaired, the excretion of urine is diminished, and it contains granular casts and albumin, and the blood urea and NPN rise above normal.
8. *Miscellaneous*—Subnormal temperature, anaemia.

CRISIS—An acute phase of the disorder in which the patient presents with severe collapse, shock, vomiting, dehydration, hypotension, profound weakness and hypoglycemia. *Causes*—Usually an intercurrent infection is a predisposing factor but at times there may be no precipitating cause. Extra exertion,

—Ulceration of throat may occur in acute leukaemia, and acute aplastic anaemia. (v) Angular ehcilitis suggests iron deficiency

*C.V.S.*—Cardiac murmur in SBE. Hemic murmur may be heard in anaemia. Hypertension in anaemia due to renal insufficiency.

*Abdomen*—1. *Splenomegaly*—in leukaemia, hemolytic anaemias, megaloblastic anaemias, myelosclerosis, multiple myeloma At times in severe iron deficiency anaemia. Splenomegaly in unusual in cases of aplastic anaemia, and secondary anaemia. 2. *Abdominal lump*—e.g., in carcinoma of stomach, retroperitoneal mass of nodes in secondary carcinoma, chronic lymphatic leukaemia or malignant lymphoma. Localised tenderness may be present with peptic ulcer.

*Lymph nodes*—Superficial nodes may be palpable in leukaemia, malignant lymphomas and secondary carcinoma.

*Bones*—Bone tenderness especially sternal tenderness may occur in anaemias secondary to marrow infiltration, e.g , in acute leukaemia, also in metastatic bone carcinoma, multiple myeloma, chronic leukaemia, myelosclerosis and malignant lymphomas.

*Breasts*—for evidence of carcinoma.

*Rectal examination*—for haemorrhoids or rectal bleeding. Size and shape of prostate gland.

*Pelvic examination*—in females with menorrhagia.

*Fundus*—infiltration in leukaemia, retinitis in anaemia due to chronic renal failure.

**III Investigations—**

According to type of anaemia.

**Management :**

1. *Correction of dietary deficiency*—Faulty dietary habits, chronic alcoholism, malnourishment.
2. *Treatment of underlying cause*—Ankylostomiasis, piles, menorrhagia, infection, chronic renal failure, leukaemia, liver diseases, collagen disease or endocrine deficiency, surgical correction of intestinal abnormality, e.g , blind loop
3. *Removal of toxic chemical agent or drug*—in some cases of hemolytic anaemia or aplastic anaemia.
4. *Blood transfusion*—Chief value is its immediate effect.
5. *Administration of substances specifically lacking*—Principles are—(a) Hematinic should be started only after adequate blood examination, since response to a hematinic may obscure the blood picture. (b) The specific hematinic

**Differential Diagnosis:**

1. *Simmond's or Sheehan's disease*—Pigmentation of skin slight and patchy. No pigmentation of mucous membranes. Loss of pubic and axillary hair. Failure of sex function early and essential feature. Response to corticotrophic hormone of pituitary; this is absent in Addison's disease.
2. *Diseases associated with asthenia*—(i) Neurasthenia due to psychogenic factors. (ii) Hyperparathyroidism is often accompanied by extreme lassitude and weakness. Blood chemistry diagnostic. (iii) Myasthenia gravis—progressive weakness.
3. *Anorexia nervosa*—Usually in adolescent females, history of psychic trauma, marked anorexia, no pigmentation. Other psychic manifestations.
4. *Other causes of skin pigmentation*—Pellagra, gastro-intestinal tuberculosis, malabsorption, genetic, familial, malignant disease, liver disease, chronic renal disease. Mouth pigmentation can be idiopathic or racial, and patchy pigment deposits in the lips are seen in syndrome of small intestinal polyposis. Pigments other than melanin are iron deposition in hemochromatosis, silver deposits in argyria and hemosiderin in some bleeding diseases.
5. *Intestinal polyposis*—Spots of brown pigmentation may be present on the skin and lips as well as oral mucosa. Intestinal symptoms. Sigmoidoscopy or barium enema confirms diagnosis.
6. *Salt-losing nephritis*—Steroid output in urine normal but of aldosterone high. In Addison's disease both values low.

**Treatment:**

REPLACEMENT THERAPY—

(a) *Cortisone (glucocorticoid) substitution*—Initial—Hydrocortisone 20 mg. (equivalent to 5 mg. prednisolone or 0.5 mg. delta- or beta-methasone) thrice daily for 72 hours. Maintenance—20 mg. morning and 10 mg. evening.

(b) *Aldosterone (mineralocorticoid) substitution*—Fludrocortisone 0.1 mg. in the morning. Patients should be checked monthly for at least first 3 months for weight, B.P., plasma electrolytes and blood urea. Signs of under-treatment are persistent hypotension and raised blood

hemolysis as in paroxysmal nocturnal hemoglobinuria, severe valvular heart disease or valvular prosthesis.

**Clinical Features:**

A. MANIFESTATIONS OF UNDERLYING CONDITION—e.g., pain of peptic ulcer, epigastric lump in carcinoma stomach.

B. DUE TO ANAEMIA—Insidious onset of easy fatiguability, weakness, headache, bodyache, inability to concentrate, giddiness. With severe anaemia palpitation, exertional dyspnoea, anginal pain and congestive cardiac failure. Haemic murmur may be heard.

C. DUE TO IRON DEFICIENCY ANAEMIA—

1 *Tongue*—Smooth and pale (bald tongue). Sometimes angular stomatitis.
2. *Dysphagia*—from formation of mucosal webs at junction of pharynx and oesophagus. The combination of splenomegaly, koilonychia and dysphagia is known as Plummer-Vinson or Kelly-Paterson syndrome.
3. *Gastritis*—usually does not give rise to symptoms. Demonstrated by gastric biopsy.
4. *Nail changes*—Nails may be thin and fragile. Platynychia and koilonychia More frequent in adults.
5. *Hepatosplenomegaly*—usually mild degree may occur. Regresses with correction of iron deficiency.
6. *Pica*—Perversion of appetite in form of geophagy or pagophagia (excessive eating of rice).
7. *Miscellaneous*—(a) Oedema of feet due to CCF, impaired renal function or hypoproteinemia. (b) Amenorrhoea in females, sometimes menorrhagia. (c) Increased intracranial tension and papilloedema rare. (d) In children—long-standing anaemia can cause fronto-parietal prominence and face resembling that in Cooley's anaemia. (e) Parotid gland swelling. (f) Hair loss.

**Investigations:**

I **To establish and assess severity of anaemia—**

1. *Blood picture*—RBC count, haemoglobin and hematocrit decreased. MCV, MCH and MCHC all decreased Peripheral smear shows hypochromia—increase in central pale area of the red cell, the severity of hypochromia varies with the severity of anaemia. Red cells smaller in size (microcytosis). Morphological changes — with severe anaemia anisopoikilocytosis, few target cells, elongated 'pencil' cells, occasional polychromasia. With co-existing

6. *Hypertension and oedema*—due to salt retention.
7. *Mental symptoms*—Insomnia, excitability and sometimes frank psychosis.
8. *Sex function*—Loss of libido, amenorrhoea in women.
9. *Diabetes mellitus.*

**Diagnosis:**

A. TESTS INDICATING CORTISOL OVERPRODUCTION—

**Screening tests:**

1. *Urinary free cortisol*—24-hours urinary cortisol is elevated in Cushing's syndrome. No Cushing's if values by fluorimetry less than 360 μg/day in men, and less than 280 μg/day in women (122 μg and 101 μg respectively by CPB).
2. *Overnight dexamethasone suppression test*—2 mg of dexamethasone is given orally on retiring. Plasma cortisol is measured at 9 hours; if less than 60 μg/litre, Cushing's syndrome is excluded.

**Definitive tests:**

1. *Urinary free cortisol*—measured on at least three occasions is most useful test.
2. *Urinary 17-oxogenic and 17-oxosteroids*—are only elevated in gross Cushing's syndrome.
3. *Plasma cortisol circadian rhythm*—

| | | | |
|---|---|---|---|
| Normal | 9 a.m. | 6-26 | μg/100 ml |
| | 6 p.m. | < 15 | μg/100 ml |
| | Midnight | < 8 | μg/100 ml |

A normal rhythm excludes Cushing's syndrome of whatever cause.

4. *Insulin tolerance test* (ITT)—Insulin 0.15 U/kg body weight IV. In Cushing's syndrome plasma cortisol does not rise in response to hypoglycemia.

B. FOR ESTABLISHING THE CAUSE OF CORTISOL OVERPRODUCTION:

1. *Plasma ACTH*—elevated in pituitary-dependant disease and ectopic ACTH syndrome (most commonly seen in patients with oat cell carcinoma of bronchus), undetectable in adrenal neoplasm.
2. *Dexamethasone suppression test*—Give 0.5 mg dexamethasone every 6 hours for 8 doses starting at 9 a.m. and measure 9 a.m. plasma and urinary cortisol daily. These are suppressed by at least 50% in Cushing's disease.

(b) *Anaemia of chronic disorders*—e.g., neoplasms, chronic infection or collagen disease. The anaemia is usually normochromic normocytic, but sometimes becomes hypochromic. Iron found in bone marrow, serum iron decreased and TIBC normal or low. Anaemia fails to respond to iron and responds only to improvement of underlying condition.

(c) *Sideroblastic anaemias*—These are either hereditary (male sex-linked) or acquired. Acquired anaemia may be caused by toxic agents such as alcohol, isoniazid, chloramphenicol, lead, pyrazinamide; or may be idiopathic refractory sideroblastic anaemia associated with defects in the enzymes involved in haem synthesis. Diagnosis—Bone marrow shows erythroblasts with ring of iron granules around the nucleus "ring sideroblasts". Serum iron and transferrin saturation are increased. If anaemia is due to toxic agents it will recover if toxic agent is removed. Other patients will respond to pyridoxine and/or folic acid, but most do not respond to treatment.

(d) *Thalassemias*—In beta thallasemia trait the picture is similar to that of iron deficiency but can usually be distinguished on the basis of investigations. Hb is only moderately reduced (never below 10g/dl.) but MCV is disproportionately low (usually between 60–70 fl) and the red cell count is usually high or normal Serum iron and TIBC are normal. Diagnosis can be confirmed by finding a raised percentage of $HbA_2$ and/or HbF.

(e) *Megaloblastic anaemias*—Chronic diarrhoea, anorexia, pigmentation especially of knuckles, apathy, memory disturbances, and involvement of spinal cord would be in favour of megaloblastic anaemia. No koilonychia Peripheral smear will show macrocytosis and neutrophils with multiple lobes (macropolycytes). There may be leucopenia and rarely thrombocytopenia Bone marrow will show megaloblastic erythropoiesis and giant myelocytes and metamyelocytes.

2. CIRRHOSIS OF LIVER—may be suspected because of mild anaemia and slightly enlarged spleen. Normal liver function tests do not rule out compensated cirrhosis. Liver biopsy, barium swallow for oesophageal varices, and portosplenogram provide evidence of portal hypertension.

development and accelerated epiphyseal maturation Because of inhibitory action of androgen on pituitary, breast development and menses do not occur.

III. **Primary hyperaldosteronism** (Conn's syndrome) *Definition*—Syndrome produced by excessive secretion of aldosterone from an adenoma or hyperplasia of adrenal cortex, or rarely malignant neoplasm.

*Clinical features*—1. *Hypertension*—may not be symptomatic. 2. *Hypokalemia* produces—Thirst, polyuria, nocturia, hypertension, weakness, periodic paralysis, muscular cramps and tetany.

*Diagnosis*—(a) Suspected if decreased serum K ($<3.5$ mEq/1) with K excretion of more than 40 mEq/24 hours. (b) Confirmed by—combination of increased production of aldosterone and reduced plasma renin activity.

**Differential diagnosis:** of hypertension and hypokalemia—1. *Essential hypertension with*—(a) Vomiting and diarrhoea. (b) Diuretic therapy. (c) Oral contraceptives or oestrogen therapy. (d) Steroid therapy. 2 *Renal disease*—(a) Accelerated or malignant hypertension. (b) Reno-vascular hypertension. (c) Potassium-losing nephropathies e.g. chronic pyelonephritis. (d) Renin-secreting renal tumor. 3. *Adreno-cortical dysfunction*—(a) Primary aldosteronism. (b) Cushing's syndrome and ectopic ACTH syndrome. (c) Endogenous mineralocorticoid excess (some adrenocortical tumors). (d) Exogenous administration of mineralocorticoid. 4. *Pseudo-aldosteronism*—(excessive liquorice ingestion).

*Treatment*—If hyperplasia is suspected, spironolactone 200-400 mg/day will correct hypokalemia. Otherwise bilateral adrenalectomy.

## HYPERADRENALISM

### Pheochromocytoma

**Etiology**—Benign, or rarely malignant tumour of chromaffin adrenal tissue causing excessive secretion of adrenaline and noradrenaline. Bilateral in about 10 per cent of cases. Age—any, usually 20 to 40. Known associations are with neurofibromatosis, medullary carcinoma of thyroid and with hyperthyroidism (multiple endocrine adenomatosis).

**Clinical features:**

1. HYPERTENSION—cardinal feature. (a) *Paroxysmal*—Attacks of paroxysmal hypertension arise suddenly lasting for minutes

oral dose of 100-120 mg of elemental iron would suffice to provide adequate iron for optimum Hb. rise

2. *Preparations*—All ferrous salts (sulphate, gluconate, lactate, fumarate or succinate) are absorbed almost equally Iron from ferric salts is poorly absorbed Iron absorption is enhanced by combining iron salts with hydrochloric acid, ascorbic acid, succinic acid, fructose, cysteine, isonine and cobalt. Due to enhanced absorption, the dose of elemental iron can be reduced This may be useful in the occasional patient who does not tolerate iron in the usual dose.

3 *Dosage and Administration*—The optimum dose as stated earlier is 100–120 mg. of elemental iron per day. In order to avoid GI side-effects of therapy, it is advisable to start with a small dose (50 mg. of elemental iron) and increase to full dose after few days. For sake of convenience preparations containing 30 mg. or more of elemental iron per tablet or capsule are preferable so that patient can take one tablet b.d or t.d s., or as a single dose at bed time Administration after food minimises gastric upset Iron can be prescribed in the form of tablets, capsules, liquid or drops.

4 *Duration of therapy*—It takes about 8 weeks for Hb. to reach normal level, irrespective of the initial Hb. level Replenishment of iron stores begins only after Hb. level is normalised and this takes about 4 months. Hence iron therapy should be continued for 6 months.

5. *Side effects*—Mainly gastrointestinal—nausea, vomiting, epigastric pain, constipation or diarrhoea. Iron therapy may precipitate haemolysis in cases of paroxysmal nocturnal haemoglobinuria.

II PARENTERAL IRON THERAPY—

1. *Indications*—(a) Intolerance of oral iron. (b) For getting rapid response—anaemia late in pregnancy, before surgery (c) Continuous blood loss through GI tract due to inoperable conditions, e g., intestinal polyposis or hereditary haemorrhagic telangiectasis. (d) Malabsorption. (e) GI conditions which may be aggravated by oral iron—e.g., peptic ulcer, ulcerative colitis, bleeding piles. (f) When patient cannot be relied upon to take oral iron.

2. *Preparation*—

(a) *Iron dextran* (Imferon)—IM (by z track technique), or IV undiluted or diluted in form of drip for giving

a postural fall. Betablockers may be given simultaneously, or Labetalol (combined alpha and beta blocker effect).

## 6. THE PANCREAS

### DIABETES MELLITUS

**Classification :**

1. PRIMARY DIABETES MELLITUS (DM)—No definite cause.
   Insulin-dependent type (IDDM, Type 1).
   Non-insulin-dependent type (NIDDM, Type 2).
2. SECONDARY DIABETES MELLITUS : associated with known conditions and syndromes: (a) *Endocrine*: Acromegaly, Cushing's syndrome, pheochromocytoma, Conn's syndrome, glucagonoma, congenital absence of islets. (b) *Metabolic*: Hemochromatosis, iron overload, pancreatic calcification. (c) *Drug-induced*: Steroids, thiazide diuretics. (d) *Miscellaneous*: Chronic pancreatitis, cystic fibrosis, mumps, rubella, insulin receptor antibodies, genetic syndromes

**Pathogenesis :**

IDDM—1. *Immunology*—(a) Antipancreatic cell mediated immunity. (b) Humoral immunity. (c) Associated with autoimmune disorders such as Addison's disease, myxoedema, Hashimoto's thyroiditis, hypoparathyroidism. 2. *Genetics*—In addition to increased frequency of certain HLA types in IDDM, there is also increased frequency of complete HLA identity between diabetic siblings in families where more than one member is affected. Also non-diabetics who are HLA identical with a diabetic sibling and who have detectable circulating complement fixing islet cell antibody are at considerably increased risk of developing diabetes. Viral infection appears to be the most probable agent linking the genetic susceptibility with beta-cell damage and failure perhaps directly or by way of intermediate autoimmune processes.

NIDDM—(a) Underlying *genetic susceptibility* seems to play an even more important role. With NIDDM almost all affected identical twin pairs are concordant for the disease compared to only about 50% with IDDM. (b) *Obesity* is a major factor capable of unmasking an underlying NIDDM susceptibility. (c) *Nutrition*—No single component of nutrition is especially diabetogenic, though iron overload may produce pancreatic damage and consumption of spoiled cassava in protein malnourished people is thought to cause pancreatic fibrosis and diabetes

**II. Folic acid deficiency—**

1. *Inadequate intake*—(a) Predisposing conditions include poverty, old age, alcoholism, psychiatric disturbance, scurvy, goat's milk anaemia. (b) Kwashiorkor.
2. *Malabsorption*—Gluten-induced enteropathy, dermatitis herpetiformis, tropical sprue, specific malabsorption.
3. *Excess demands*—(a) Pregnancy and lactation. (b) Prematurity. (c) Chronic haemolytic anaemias. (d) Malignant diseases (myelosclerosis, lymphoma, carcinoma). (e) Chronic inflammation (tuberculosis, rheumatoid arthritis). (f) Excess losses (congestive heart failure, acute liver disease, chronic dialysis).
4. *Drugs*—Anticonvulsants, barbiturates. Trimethoprim. Alcohol.
5. *Metabolic*—Homocystinuria.

**III. Defective DNA synthesis—**

(Not due to lack of $B_{12}$ or folic acid).

1. *Congenital*—(a) Inborn errors of folate metabolism. (b) Orotic aciduria. (c) Transcobalamin II deficiency. (d) Lesch-Nyhan syndrome.
2. *Acquired*—(a) Erythroleukaemia, other myeloid leukaemias (b) Cytotoxic drugs.

**Clinical features—**

1. *Due to anaemia*—Shortness of breath, dyspnoea, pallor, and in older subjects angina or cardiac failure.
2. *Gastrointestinal*—Diarrhoea, loss of appetite and weight. Sore tongue due to glossitis and angular cheilosis. Mild jaundice (from intramedullary breakdown of haemoglobin and shortened red cell life span) may give the patient a lemon yellow tint.
3. *Fever*—of mild degree due to anaemia itself, or due to infection of urinary or respiratory tracts which may precipitate anaemia in patients with pre-existing subclinical $B_{12}$ or folate deficiency.
4. *Spleen*—may be palpable in less than half the patients.
5. *Neurological manifestations*—(a) Neuropathy—Paraesthesiae affecting feet more than hands. Difficulty in walking, and high stepping, stamping gait. On examination, sensory loss in the legs and positive Romberg's sign may be present. (b) Subacute combined degeneration—With involvement of posterior and lateral columns, spasticity, increased leg reflexes and extensor plantar response and sensory loss (c) Optic neuropathy. (d) Depression, impaired memory, rarely severe organic dementia. EEG may show slowing of waves.

oedema, Charcot arthropathy, diabetic osteopathy. (f) Respiratory arrests—occurring during or after anaesthesia or after any respiratory depressant has been given. (ii) *Mononeuropathy and multiple mononeuropathy*—(a) Cranial nerve palsies (III and VI). (b) Femoral neuropathy (diabetic amyotrophy). (c) Radiculopathy. (d) Other isolated peripheral nerve lesions. (g) Others—hypoglycemic unawareness, sluggish pupillary reflexes, Argyll Robertson pupil.

7. *Renal*—Diabetic nephropathy—Proteinuria, peripheral oedema, renal failure, normochromic anaemia, hypertension, pyelonephritis.
8. *Sexual*—Delayed development of secondary sexual characters, early menopause, reduction of fertility and libido in females.
9. *Hepatomegaly*—due to fatty or glycogen infiltration.
10. *Complications due to insulin treatment*—(a) Hypoglycemia. (b) Atrophy of subcutaneous fat at site of injection, rarely lipohypertrophy (insulin tumefaction). (c) Allergic reactions. (d) Presbyopia due to insulin. (e) Insulin oedema due to rapid control of severe diabetes with insulin.
11. *Complications in pregnancy*—(i) Maternal—miscarriages and abortions common. High rate of still births, pre-eclamptic toxemia, oedema and hydramnios. (ii) Foetal—Increased weight due to oedema and fat, jaundice common, tendency to hypoglycemia, pulmonary atelectasis, high mortality.
12. *Acute diabetic abdomen*—Severe ketosis or pre-coma sometimes produces symptoms of acute appendicitis or ulcer perforation, or peritonitis, without any underlying abdominal lesion.

**Diagnosis:**

1. *Urine sugar*—tested 2 hours after meals. Since the renal threshold for glucose may vary from about 160-250 mg. per 100 ml. of blood sugar, glycosuria reveals only the moderate or severe cases of diabetes.
2. *Blood sugar*—Fasting blood sugar in excess of 140 mg/100 ml or a postabsorptive blood glucose more than 200 mg/100 ml establishes the diagnosis.
3. *Oral glucose tolerance test*—Indications—(a) When random or fasting blood glucose values are equivocal. (b) Pregnancy glucosuria. (c) Follow up of patients with IGT.

folate—(Normal range 160-640 ng/litre) is a valuable guide to folate stores, but a low value can be interpreted only if serum $B_{12}$ is known. (iii) Formiminoglutamic (figlu) excretion test. (iv) Therapeutic test —with folic acid 100 mcg. daily while maintaining a diet low in folate (v) Tests for cause of folate deficiency—Tests for malabsorption, xylose excretion, glucose absorption, vitamin A absorption, fat excretion, $B_{12}$ absorption, jejunal biopsy.

**Differential Diagnosis:** Causes of macrocytosis other than megaloblastic anaemia—1 Alcoholism 2. Liver disease. 3 Myxoedema. 4. Aplastic anaemia and red cell aplasia. 5. Blood regeneration. 6. Primary acquired sideroblastic anaemia (some cases). 7. Myeloma. 8. Leucoerythroblastic anaemia. 9. Drugs like phenytoin, phenobarb, mysoline and oral contraceptives 10 Preleukemic syndrome.

**Pernicious anaemia:**

**Etiology:** (a) *Age*—40-60. (b) *Sex*—more in females. (c) *Race*—incidence highest in North Europeans. (d) *Family history*—The disease is about 20 times more common in close relatives (sibs, parents and children). (e) *Cause*—it is an autoimmune disease in which antibodies to gastric parietal cells produce gastric atrophy and achlorhydria and antibodies to intrinsic factor interfere with its role in vitamin $B_{12}$ absorption

*Associated disorders*—(a) The disease may be associated in patient or in relatives with thyroid disease (primary myxoedema, Hashimoto's disease or thyrotoxicosis), hypoadrenalism, hypoparathyroidism, immunoglobulin deficiency, and possibly with diabetes mellitus. (b) Correlation with early graying of hair, vitiligo, blue eyes and blood group A in patients or their close relatives. (c) Carcinoma stomach is three times more common.

**Diagnosis**—(a) Tests for vitamin $B_{12}$ absorption. (b) Examination of serum and gastric juice for parietal cell (present in 90%) and intrinsic factor antibodies. (c) Measurement of gastric acid and intrinsic factor secretion after pentagastrin stimulation. (d) Barium meal, gastroscopy and biopsy.

**Treatment:** of megaloblastic anaemia.

1. VITAMIN $B_{12}$ DEFICIENCY—(a) *Initial*—Hydroxycobalamin 1000 mcg IM 6 injections in 2-3 weeks is adequate to replenish stores. (b) *Maintenance*—500-1000 mcg IM every 3 months for life. In follow-up of patients with pernicious

Patient must be advised to be constant in his dietary habits from day to day.

**Types of Diet—**

UNWEIGHED DIET—Diabetes in many newly-diagnosed patients, especially the obese, can be controlled by simple limitation of carbohydrate. Owing to the simplicity of this form of diet, it should be tried first in suitable patients particularly the elderly.

(a) *Forbidden foods*—Sugar, jam, honey, syrup, tinned fruits, sweets and chocolate, glucose drinks, foods made with sugar, cakes, sweet biscuits, puddings, thick sauces, rice and alcoholic drinks (may be allowed in moderation if necessary).

(b) *Foods allowed in moderation*—Bread of all kinds and chappatis made from wheat or millets, plain biscuits, potatoes, peas, and baked beans; breakfast cereals and porridge; all fresh or dried fruit and fruit juices; macaroni, spaghetti, custard and foods with much flour; thick soups, milk.

(c) *Free foods*—All meat, fish, eggs (not fried), clear soup or meat extracts; tea or coffee; vegetables such as cabbage, cauliflower, spinach, pumpkin, brinjal, lady's finger, turnip, french beans, cucumber, lettuce, tomato, spring onions, radish, asparagus. Spices, salt, pepper and mustard; butter and margarine. Saccharine for sweetening.

WEIGHED DIET—Required for nearly all diabetics on insulin, and for those treated by diet alone or by oral hypoglycemic drugs in whom the unweighed diet has proved unsatisfactory. The system of exchanges are easy to follow and prevent the diet from becoming monotonous and unappetizing; and if weighed and measured accurately.

(a) *Total calories*—A rough method can be used:

| *Nutritional condition of patient* | *Type of activity* | | |
|---|---|---|---|
| | *Sedentary* | *Light work* | *Heavy work* |
| | *Calories per kg. body weight* | | |
| Overnutrition ... | 25 | 30 | 35 |
| Normal ... | 30 | 35 | 40 |
| Undernutrition ... | 35 | 40 | 45 |

An obese diabetic should diet till body weight is reduced to 5% below ideal weight (Calories 1400), a thin

**Causes:**

**I. Genetically-determined haemolytic anaemias:**

(All due to intra-corpuscular defect except PNH which is acquired.)

A. *Enzyme deficiencies*—which result in abnormal energy metabolism:
1. Glucose-6-phosphate-dehydrogenase (G6PD) deficiency.
2. Pyruvate kinase deficiency.
3. Triosephosphate isomerase deficiency.

B. *Haemoglobinopathies*:
1. Structural haemoglobin variants.
2. Thalassemia syndrómes.

C. *Disorders of the red cell membrane*:
1. Hereditary spherocytosis.
2. Elliptocytosis.
3. Acanthocytosis in abetalipoproteinemia.
4. Stomatocytosis.

**II Acquired haemolytic anaemias:**

A. ASSOCIATED WITH ANTIBODIES TO THE RED CELL—
1. Isoantibodies—haemolytic disease of the newborn.
2. Transfusion reactions.
3. Autoimmune haemolytic anaemia—warm antibody type, drug-induced, cryopathic haemolytic anaemia.

B. NOT ASSOCIATED WITH ANTIBODY FORMATION—
1. *Acquired membrane defects*—paroxysmal nocturnal haemoglobinuria (PNH), liver disease, uremia, vitamin E deficiency.
2. *Trauma*—microangiopathic haemolytic anaemia, cardiac haemolysis, march haemoglobinuria.
3. *Physical agents*—e.g., severe burns.
4. *Chemical agents*—snake venom, drugs.
5. *Infections*—parasitic, bacterial, disseminated intravascular coagulation.
6. *Multifactorial*—Anaemia of chronic disorders, hypersplenism, malignancy including lymphomas, collagen vascular disorders.

**Recognition of haemolytic state**

**1. Evidence of increased rate of red cell destruction—**

(i) *Intravascular*—(a) Decreased haptoglobins. (b) Increased plasma haemoglobin, and methemalbumin. (c) Haemoglobinuria. (d) Hemosiderinuria (in chronic IV haemolysis).

Dinner

| *Mixed diet* | *Vegetarian diet* |
| --- | --- |
| Chicken soup 1 cup | Tomato soup 1 cup |
| Lean meat or baked fish average helping | Cooked cabbage or other green leafy vegetable |
| Cooked french beans | Potato baked 1 (medium) |
| Bread 1 slice | Dal 1 cup |
| Pudding from remainder of ration of milk and sugar | Chappatis 2 |
| | Buttermilk 1 cup |
| | Pudding from remainder of ration of milk and sugar |

Daily ration

| | |
| --- | --- |
| Skimmed milk 2½ cups | Skimmed milk 4 cups |
| Sugar 3 teaspoons | Sugar 3 teaspoons |

Fat for cooking (preferably as oil) and butter 6 teaspoons.

*System of food exchanges:*

| *Cereals* | *Protein* |
| --- | --- |
| Biscuits 3 | Eggs 2 small |
| Breakfast cereal 1 helping | Milk: cow's ¾ cup |
| Chappatis wheat thin 2 or made from millets—bajra, jowar or ragi 2 | buffalo's ½ cup |
| Khakhra 2 | Skimmed 1 cup |
| Rice 4 tablespoons | Skimmed milk powder 2 tablespoons |
| | Meat, fish or chicken average helping |
| | Dal (pulses)—one cup |

| *Vegetable* | *Fruits* | |
| --- | --- | --- |
| Potato (medium) 1 | Apple 1 | Sweet lime 1 |
| Peas or beans 4 tablespoons or as 1 cup of thin dal | Figs 3 | Gauva 1 |
| | Orange 1 | Papaya ½ |
| | Water melon ¼ | Melon ½ |

II. **Oral antidiabetic agents:** Diabetic symptoms or substantial hyperglycemia with trivial or absent ketonuria persisting after 3 or 4 weeks of dietary management are the main indications.

**Sulphonylureas**

*Mode of action*—Stimulate production of insulin but later also have extrapancreatic (hepatic and peripheral) hypoglycemic effects.

*Indications*

1. Maturity-onset (insulin-independent) diabetics of average weight not controlled by diet.

globin chains, the *thalassemias,* or a mutation affecting the genetic DNA which leads to the formation of an abnormal globin chain, the *haemoglobin variants.*

1. STRUCTURAL HAEMOGLOBINOPATHIES—

*Sickling disorders*—(i) *Sickle-cell trait*—Less than 50% Hb S per cell is usually not associated with clinical abnormality. Infarction of spleen may occur during anaesthesia, and hematuria not uncommon (ii) *Sickle-cell anaemia*—Anaemia from about third month of life. Painful swelling of hands and feet (hand and foot syndrome). Pallor, icterus, fever, splenomegaly. Periodic exacerbations or crises with pain in back and lower limbs and prostration. As the child grows typical sickle-cell habitus develops with longer lower segments and arms, upper dorsal kyphosis and bossing of skull The spleen is not usually palpable after adolescence since it undergoes repeated infarction (autosplenectomy). Diagnosis confirmed by Hb electrophoresis. *Management*—Between crises patient should be given folic acid regularly, and infection treated early with antibiotics. During crises rest, analgesics, hydration, correction of acidosis, plasma volume expander and oxygen. Blood if PCV falls dangerously, cerebrovascular symptoms in early childhood and recurrent pulmonary thrombotic episodes.

2 THALASSEMIAS—due to inherited defect in globin synthesis of either the alpha or beta chain.

(a) β -*thalassemia*—occur predominantly in mediterranean region and Middle and Far East.

(i) *Homozygous β-thalassemia* (Cooley's anaemia, thalassemia major). Onset—Affected children fail to thrive from about third month and become progressively more anaemic. Bone marrow expansion results in skeletal deformities—frontal bossing, cheek bone and jaw protrusion and pathological fractures of long bones Progressive hepatosplenomegaly Complications—Gallstones, chronic leg ulcers and hypersplenism. Retardation of growth and sexual development. Intercurrent infections Eventually hemosiderosis aggravated by repeated red cell transfusion, leads to cardiac, pancreatic and hepatic insufficiency.

(ii) *Heterozygous β-thalassemia*—Those affected are usually asymptomatic and diagnosis is made on discovery of hypochromic anaemia in absence of iron

| Drug | Duration of action and potency | Initial dose | Daily dose range |
|---|---|---|---|
| Glibenclamide | Upto 24 hours Strong | 2 5-5 mg | 2 5-25 mg (Single or divided doses) |
| Glibornuride | Upto 24 hours Strong | 12.5 mg | 12-75 mg (Single or divided doses) |
| Glipizide | Upto 24 hours Strong | 2 5-5 mg | 2 5-30 mg (Single or divided doses) |
| *Biguanides*: Metformin | 12-24 hours | 1.0-1 5 g | 0 5-3 0 g (Divided doses) |
| Phenformin | 4-6 hours | | |
| Phenformin *long-acting* | 12-24 hours | 25-50 mg | 25-150 mg (Divided doses) |

**Biguanides**—

*Mode of action*—Major effect is to increase peripheral uptake of glucose and in large doses to delay or decrease intestinal absorption.

*Indications*—

1. Treatment of 'maturity-onset' obese diabetic who has failed to lose weight on diet.
2. In combination with sulphonylureas—To enhance the inadequate or failing effects of sulphonylureas.
3. As an adjunct to insulin therapy in brittle diabetes whose blood sugar tends to swing unpredictably, one who is prone to ketosis and who develops hypoglycemia with only slight overdose of insulin.

*Adverse effects*—

1. Malaise, weakness, drowsiness.
2. Metallic taste in mouth, anorexia, nausea, dyspepsia, diarrhoea.
3. Lactic acidosis (Phenformin).
4. Vitamin $B_{12}$ malabsorption (after prolonged treatment).

III. **Insulin :**

*Indications*—(a) Young patient with severe diabetes. (b) All children. (c) Underweight patient. (d) Patients with an acute onset of diabetes. (e) When diet fails to accomplish desugarisation, or when a submaintenance diet is the only one which does so. (f) Patients having acute complications with glycosuria or

malignancies. Clinical picture ranges from mild hemolysis to life-threatening anaemia. Patient is jaundiced and may have splenomegaly. Blood shows polychromasia with spherocytes and reticulocytosis. Diagnosis is confirmed by positive Coomb's test. Treatment—Steroids IV in severely ill patients, oral prednisolne 60 mg./day for mild cases, later dose is reduced to that which will maintain an adequate Hb level; if this fails splenectomy. If both these fail immunosuppressive therapy with Azathioprine or Cyclophosphamide.

(ii) *Cryopathic hemolytic syndromes*—(Cold immune hemolytic anaemias)—There are 2 disorders in which increased red cell destruction occurs at temperatures below normal body temperature—

(a) *Cold agglutinin disease*—A marked elevation of cold agglutinins may occur either transiently in association with infections particularly with mycoplasma pneumoniae, or more persistently as part of idiopathic cold agglutinin disorder of old age, or in association with neoplasms particularly reticuloses *Clinical picture*—is variable. In acute variety—caused by Mycoplasma infection there is a brisk hemolytic episode with haemoglobinuria 2 to 3 weeks after a short respiratory illness. In chronic idiopathic form—anaemia with Raynaud's phenomena and occasional haemoglobinuria *Diagnosis*—Cold agglutinin titre markedly raised, positive direct Coomb's test, protein electrophoresis usually shows a 'monoclonal' band. *Treatment*—Patient should wear warm clothing and avoid cold weather. Chemotherapy if underlying lymphoma.

(b) *Paroxysmal cold haemoglobinuria*—rare disease characterised by intermittent attacks of intravascular hemolysis and haemoglobinuria. Often associated with syphilis, or idiopathic. May occur following measles or mumps. Severely anaemic patients may require transfusion.

4. *Drug-induced hemolytic anaemia*—Drugs which may cause haemolysis are methyldopa, penicillin, quinine and quinidine, phenacetin, sulphonamides, primaquine, nitrofurazone, phenamic acid.

B **Acquired disorders not associated with antibody formation—**

1. *Hemolytic anaemia due to trauma to red cells*—

(a) *Microangiopathic hemolytic anaemia*—characterised by intravascular haemolysis and fragmentation and dis-

sugar level replacement of part of one or both doses with intermediate duration preparation will give smoother control, or two injections of intermediate-acting insulins, each 'spiked' with a little short-acting, or use a longeracting preparation (often given before evening meal) on which the usual two peaks of short action are superimposed. Flexibility of dosage obtained by mixing is generally preferable to using pre-mixed preparations.

*Closed loop system* : (Artificial endocrine pancreas) : This is a device which continuously monitors blood glucose and decides how much insulin should be infused in order to return the blood glucose concentration to a predetermined level. Advantages—can carry diabetics safely through surgery or childbirth. Correction of ketoacidosis in patients with oscillating control (brittle diabetics). Disadvantages—It immobilises the patient and fairly constant technical attendance is required.

*Open loop systems* : Here insulin is infused without direct control by blood glucose concentration. This system is widely used in control of severe diabetic ketoacidosis (see below). Open loop IV infusion of insulin of 2-3 units/hour along with glucose 8-10 gm/hour can maintain excellent control in all diabetics during surgery or childbirth. A very fine polythene cannula implanted subcutaneously and left in situ for several weeks will deliver insulin at a rate of about 1-2 ml. (40-80 units) in 24 hours. Small bolus boosts can be delivered on demand about ½ hour before meals.

IV. **Exercise**—Judicious physical exercise of value. Improves total food and carbohydrate tolerance and reduces need for insulin. Excessive exercise contraindicated. Irregularities in time and amount of exercise permissible only for overweight diabetic patient who does not require insulin. Give a carbohydrate snack before vigorous exercise to juvenile diabetic on insulin to prevent hypoglycemia.

V. **General care**—(a) Adequate rest and sleep. (b) Tobacco and alcohol in moderation. (c) Severe diabetic should avoid driving automobile or working with power-driven machinery. (d) Personal hygiene, especially care of feet—shoes should be wide to permit toe movement, patients should not walk barefooted; toe nails should not be trimmed too short and any interdigital tinea infection should be treated, no hot water bottles should be used, and no strong antiseptics should be applied to the feet.

cirrhosis, the degree of haemolysis is usually mild. Occasionally acute haemolysis with upper abdominal pain may occur in alcoholics with liver disease, usually after a bout of drinking.

(b) *Paroxysmal nocturnal haemoglobinuria* (*PNH*)—occurs usually in third to fifth decade and is characterised by exacerbations (typically in the morning), haemoglobinuria and a thrombotic tendency. Diagnosis—Positive acid lysis test (Ham's test), haemosiderin in urine. Treatment—Repeated transfusions with washed or frozen cells if severe anaemia.

## Aplastic anaemia

**Definition**—Aplastic anaemia includes those pancytopenias where there is no evidence of either blood destruction or marrow infiltration and the marrow is of reduced cellularity.

**Causes:**

A. **Congenital—**

Fanconi's anaemia.

B. **Acquired—**

I. IDIOPATHIC OR PRIMARY APLASTIC ANAEMIA.

II. SYMPTOMATIC OR SECONDARY APLASTIC ANAEMIA:

1. *Radiation and Chemicals*—(i) *Radiation*—Therapeutic rare, more often hazard in atomic energy establishments, radioisotope factories, nuclear power stations and atomic warfare. (ii) *Chemicals*—Benzene and its related compounds which occur in solvents, insecticides and certain adhesives.
2. *Drugs*—(i) *Depending on dosage*—Cytotoxic drugs such as cyclophosphamide, methotraxate, 6-mercaptopurine, cytosine arabinoside, daunorubicin, and doxorubicin, often produce transient aplasia. With busulphan aplasia may be permanent. (ii) *Due to individual sensitivity*—(i) *Antibiotics*—(a) Chloramphenicol. (b) Sulphonamides. (iii) *Anti-inflammatory drugs*—Phenylbutazone, oxyphenbutazone, amidopyrine, gold salts. (iv) *Anti-epileptic drugs*—Phenytoin sodium, methoin, troxidone. (v) *Oral hypoglycemic agents*—Tolbutamide, chlorpropamide, (vi) *Antithyroid drugs*—Carbimazole, potassium perchlorate. (vii) *Drugs used for parasitic infections*—Mepacrine, organic arsenicals. (viii) *Antihistamines*—Chlorpheniramine. (ix)

DIFFERENTIAL DIAGNOSIS:

*D. D. of Comas in Diabetes:*

| *Type of coma* | *Blood glucose* | *Ketosis* | *Acidosis* | *Dehydration* |
|---|---|---|---|---|
| 1 Ketoacidotic hyperglycemic | +++ | +++ | +++ | +++ |
| 2 Nonketotic hyperglycemic | +++ | 0 | 0 | +++ |
| 3 Lactic acidosis | − to +++ | 0 to + | +++ | 0 |
| 4 Hypoglycemic (see below) | Low | 0 | 0 | 0 |
| 5 Renal failure | + to +++ | 0 | ++ | 0 |

D. D. OF KETOACIDEMIA FROM HYPOGLYCEMIC COMA—

| | *Diabetic coma* | *Hypoglycemic coma* |
|---|---|---|
| *History—* | | |
| Precipitating cause | Infection, trauma, too little insulin | Undue exercise, missed meal, too much insulin or oral hypoglycemic drug like glibenclamide |
| Rate of onset ... | Slow, over a period of hours or days | Abrupt, minutes |
| *Signs—* | | |
| Sweating ... | Absent | Usually marked |
| Dehydration .. | Marked | Nil |
| Respirations ... | Rapid and deep (air hunger) | Stertorous |
| Depth of coma ... | Patient usually rousable (except in advanced case) | Coma often deep |
| *CNS signs—* | | |
| Reflexes .. | Diminished | Usually brisk, extensor plantars |
| Muscular twitchings . | Absent | Common |
| Convulsions ... | Absent | May occur |
| Acetone in breath ... | Yes | No |

MANAGEMENT—

A *Initial investigations*—Blood glucose, plasma urea, plasma electrolytes, packed cell volume, blood pH, $PCO_2$, blood ketone bodies, urine (when possible), throat swab for culture, ECG.

(b) Antibiotics—for severely neutropenic patient (neutrophil $< 0.1 \times 10^9$/litre).

2. TRANSFUSIONS—(a) *Red cells*—should be kept at minimum if bone marrow transplantation is planned. (b) *Platelets*—given on clinical grounds to keep number of transfusions down and avoid formation of anti-platelet antibodies. (c) *White cells*—transfusions of granulocytes obtained from patients with chronic granulocytic leukaemia or normal donors. Should be ABO compatible with the patient. Indications are fever or established infection in a neutropenic patient which has not responded to adequate antibiotic therapy. Usually two transfusions are given 24 hours apart.
3. STEROIDS—(a) *Anabolic steroids*—Oxymetholone 3-5 mg/kg/day or methandienone 1 mg/kg/day for at least 6 months unless side effects such as liver toxicity, virilisation, growth effects (early epiphyseal fusion in children) and mineralocorticoid effects (salt retention, cramps). (b) *Corticosteroids*—10 mg/day of prednisolone for adult to reduce purpura.
4. BONE MARROW TRANSPLANTATION—Decision should be made early to reduce risk of sensitisation by prior transfusions. The donor must be carefully matched for known tissue antigens. Immunosuppression is necessary to prevent rejection.
5. ANTILYMPHOCYTIC GLOBULIN—ALG is given before an infusion of marrow from a donor who shares one human leucocyte antigen halotype with the recipient; androgens are also given Improvement in autologus marrow function may occur upto 6 months.

## 2. HAEMORRHAGIC DISORDERS

**Normal haemostatic mechanism :** There are three components of normal haemostatic mechanism—vascular, platelets and coagulation.

1. *Initiation*—(a) Capillary constriction which reduces the flow of blood. (b) Sticking of platelets to the damaged vessel wall. Failure of the mechanism at this stage results in persistent haemorrhage following injury. This immediate bleeding is seen typically in thrombocytopenia
2. *Maintenance*—Activation of the blood clotting system laying down fibrin strands over the platelet plug Failure of this stage results in delayed bleeding following injury and is seen classically in haemophilia.

**Process of blood coagulation :**

*Intrinsic mechanism*—(1) On contact of blood with a foreign surface such as damaged intima of a vessel, or prosthetic valve,

4. *Potassium*—Replacement should be started with the insulin unless serum potassium is high initially. Replacement should be at the rate of 15mEq/hour (15 mmol/hour). Usually 200 mmol are required in first 24 hours. Serum potassium should be re-estimated 2 and 4 hours after start of treatment. (An ECG monitor gives a good guide to rapid changes in plasma potassium).

5 *Other measures*—

(a) *Stomach aspiration*—should be done in all unconscious patients and if stomach is distended, in order to reduce risk of inhalation of vomit

(b) *Antibiotics*—if suspicion of infection, or CVP line or bladder catheterization.

(c) *Catheterization*—should be avoided unless bladder becomes distended.

(d) *Oxygen*—should be given in early stages.

(e) *Heparin*—to protect the elderly, severely dehydrated and unconscious patients (unless obvious contraindications) from thrombotic complications, 10,000 units IV 8-hourly for 24 hours.

(f) *Blood of plasma*—2 units should be given if persistent hypotension.

(g) *Treatment of complications*—(i) *Hypotension and shock*—Usually respond to insulin, water and salt. Persistent peripheral circulatory failure should be treated with noradrenaline. Possible complicating causes should be treated—blood loss or anaemia, evidence of heart failure, low serum sodium, myocardial infarction, pancreatitis or adrenal insufficiency. (ii) *Renal failure*—The osmotic diuretic mannitol for prophylaxis of acute tubular necrosis in severe cases, or oliguric states unresponsive to conventional therapy, or when oliguria or anuria has been present for 3 hours or more after rehydration. Dose: 12.5 gm. IV in 3-5 minutes; if urine flow appears then to be increased, mannitol may be continued as a slow infusion of 25 gm. per 500 ml. (iii) *Arterial occlusion*—may occur during recovery phase in elderly patients with severe hyperosmolarity. The risk of this complication may

NOMENCLATURE OF CLOTTING FACTORS:

| *Factor* | *Synonyms* | *Deficiency states* |
|---|---|---|
| PHASE 1 | | |
| V | Pro-accelarin | Congenital deficiency, liver disease, diffuse intravascular clotting. |
| VII | Pro-convertin | Congenital deficiency, vitamin K deficiency, liver disease, coumarin. |
| VIII | Anti-hemophilic factor (AHF) Anti-hemophilic globulin (AHG) | Hemophilia, Von Willebrand's disease, diffuse intravascular clotting. |
| IX | Christmas factor. Plasma thromboplastic component (PTC) | Christmas disease, liver disease, coumarin therapy. |
| X | Stuart-Prower factor | Congenital deficiency, liver disease, coumarin. |
| XI | Plasma thromboplastin antecedent | Congenital deficiency. |
| XII | Hageman factor (HF) | Congenital factor XII deficiency. |
| XIII | Fibrin stabilising factor | Congenital deficiency, probably uremia. |
| PHASE 2 | | |
| II | Prothrombin | Congenital deficiency, liver disease, coumarin, diffuse intravascular clotting. |
| PHASE 3 | | |
| I | Fibrinogen | Congenital afibrinogenemia, liver disease, diffuse intravascular clotting Conversion to fibrin inhibited by heparin. |

(B) ACQUIRED COAGULATION DEFICIENCIES—Vitamin K deficiency. liver disease, anticoagulants.

II **Platelet disorders**—

(A) INHERITED PLATELET ABNORMALITIES—(i) Thrombasthenia (ii) Hereditary giant platelet (Bernard Soulier) syndrome. (iii) Platelet release defects—Storage pool disease, cyclo-oxygenase platelet deficiency. (iv) Congenital thrombocytopenia.

(B) ACQUIRED ABNORMALITIES—

1. *Thrombocytopenia*—

(a) *Failure of platelet production*—(i) Aplasia of bone marrow. (ii) Drugs and chemicals. (iii) Leukemia. (iv) Bone marrow infiltration in secondary carcinoma, multiple myeloma, malignant lymphoma. (v) Megaloblastic anemia.

## HYPOGLYCEMIA

**Causes:**

A. Reactive postprandial hypoglycemia—only occurs in response to meals.

1. *Alimentary hypoglycemia*—Gastrectomy, gastrojejunostomy or pyloroplasty.
2. *Enzyme deficiency*—Fructose intolerance and galactosemia (in infants and children).
3. *Diabetes*—Early diabetes and near-normal fasting plasma glucose levels.
4. *Idiopathic reactive hypoglycemia*—may occur during glucose tolerance test.

B. Fasting hypoglycemia—precipitated by deprivation of food.

1. *Insulinomas.*
2. *Alcohol ingestion.*
3. *Hypopituitarism.*
4. *Liver disease*—Cirrhosis, liver failure, hepatic congestion secondary to cardiac failure.
5. *Factitious hypoglycemia.*
6. *Extrapancreatic sarcomas*—Retroperitoneal fibrosarcomas, mesotheliomas.

**Clinical features:**

Symptoms—Early symptoms are sweating, headache, inability to concentrate and irritability. Hunger, faintness, paraesthesiae of lips and fingers and palpitation may be complained of. If hypoglycemia is not corrected irrational or aggressive behaviour, loss of consciousness and eventually convulsions.

Signs—

1. *Due to cerebral dysfunction* (*Neuroglycopenia*)—Slurred speech or aphasia, in-co-ordination followed by loss of consciousness. Twitching of muscles, or choreiform or athetoid movements, bilateral extensor plantar responses. Transient mono- or hemi-plegia. CNS manifestations often predominate when blood sugar falls slowly. Prognosis for recovery of cerebral function deteriorates with increasing duration of coma. Severe or recurrent episodes of hypoglycemia may result in permanent cerebral damage.
2. *Due to excess adrenaline* (*Adrenergic*)—provoked by low blood sugar level. Warm, sweaty skin, pallor, dilated

ficiency. (v) Sudden, severe bleeding from multiple sites after prolonged surgery or during obstetric procedures suggests acquired fibrinogen deficiency. (vi) Massive bleeding from a single site without history of purpura or previous bleeding suggests surgical or anatomic defect rather than coagulation defect.

3. *Coexisting disease*—responsible for disorder of hemostasis.
4. *History of drug ingestion*—e g. quinine, quinidine, non-steroid anti-inflammatory drugs, phenobarbitone, anticoagulants, etc.
5. *Occupation*—Radiation hazards.
6. *Diet*—Vitamin C deficiency.

(b) PAST HISTORY :

1. *Past history of bleeding*—(a) Hemorrhagic incidents such as epistaxis, petechial hemorrhages, hematoma, melena, hematuria, hemoptysis, menorrhagia or postpartum bleeding. (b) Bleeding following trauma or surgery—Tooth extraction, tonsillectomy, accidents, etc
2. *Response to therapeutic measures.*

(c) FAMILY HISTORY OF BLEEDING in hemophilia, idiopathic thrombocytopenic purpura, multiple hereditary telangiectasia, constitutional fibrinopenia, idiopathic hypoprothrombinemia and thrombasthenia.

**Physical examination—**

1. *General appearance*—Icteric, cachectic, plethoric, Cushingoid, myxoedematous.
2. *Skin*—Petechiae, ecchymoses, telangiectases, hemangiomata Texture and elasticity of skin. Bleeding manifestations of patients with hemorrhagic disorders include spontaneous skin and mucous membrane bleeding, petechiae and superficial bruising. Bleeding usually starts within seconds of injury and continues for hours, but once it stops it does not usually recur. In contrast, patients with coagulation defects develop deep spreading hematomas, bleeding in joints, hematuria and retroperitoneal bleeding. Post-traumatic bleeding tends to be delayed, and then may recur at a later date for upto 4 to 5 days Lax skin and tissue paper scars on knees and elbows suggest Ehlers-Danlos syndrome.
3. *Mouth*—Petechiae, hematoma, telangiectasis, blood crusts about lips and gums.

(b) Benedict's test at 50-60°C for 10 minutes. Pentose and fructose reduce.

(c) Fermentation tests—Glucose, fructose, and galactose are fermentable by yeast.

(d) Qualitative tests specific for certain sugars, e g., Bial's test for pentose—5 ml. of Bial's reagent boiled in test tube and 2 ml. urine added; the solution turns green if pentose is present.

(e) Phenylhydrazine reaction—This reaction depends on formation of rather typical osazone crystals and determination of their melting point. Positive identification not possible.

(f) Polariscopy—(i) Dextrorotatory—glucose, lactose, (ii) Levorotatory—fructose, (iii) Not optically active—pentose.

(g) Paper chromatography—More sensitive to small amounts of sugar and more specific particularly in case where there is more than one sugar or other reducing substance in the urine.

function is necessary—(i) *Aggregation tests*—ADP, collagen, adrenaline, ristocetin and arachidonic acid are major inducers of platelet aggregation. The pattern of observed responses differentiates the nature of the abnormality. Thrombosthenic platelets fail to aggregate with most agents, release defects have a depressed response to collagen. (ii) *Platelet coagulation activity*—to detect release abnormalities and some intrinsic platelet disorders. (iii) *Prothrombin consumption test*—for platelet factors and intrinsic coagulation pathway.

2. SCREENING TESTS FOR COAGULATION DISORDERS—

| *Test* | *Defect* |
|---|---|
| (i) *Activated partial thromboplastin time* | Prolonged in intrinsic pathway defects<br>Factors XII, XI, IX, VII, X, V, II, I |
| (ii) *Prothrombin time* (Normal 18-25 seconds) | Monitors intrinsic pathway.<br>Factors VII, X, V, II, I |
| (iii) *Thrombin clotting time* (Normal upto 18 seconds) | Factor I<br>Fibrin degradation products |

(iv) *Congenital coagulation deficiencies*—

| *Factor* | Bl. time | APTT | PT | TCT | Abnormality Assay |
|---|---|---|---|---|---|
| Hemophilia A | — | ↑ | — | — | Factor VIII C |
| Hemophilia B | — | ↑ | — | > | Factor IX |
| von Willebrand | ↑ | — or | — | > | Factor VIII C<br>Factor VIII AC |
| Afibrinogenemia | ↑ | ↑ | ↑ | ↑ | Factor I |

(v) *Some factor VIII activities*—factor VIII coagulants (clotting assay). factor VIII protein (electro-immunodiffusion), von Willebrand's disease (ristocetin cofactor assay).

3. INTRAVASCULAR CLOTTING AND FIBRINOLYSIS—(i) TCT for detecting abnormalities in fibrinogen and its degradation products (FDP). In primary fibrinolysis, TCT is prolonged. (ii) Direct measurement of FDP by immuno-agglutination of latex particles.

4. SPECIAL TESTS—

(a) Coagulation factor assays including plasma fibrinogen
(b) Platelet function tests.
(c) Tests for circulating inhibitors.

5. OTHER TESTS—(a) *Urine*—for albumin, red cells, hemoglobinuria (b) *LE cell test*—Thrombocytopenia may be the first manifestation of disseminated lupus. (c) *Bone marrow.*

syrup or candy taken orally sufficient. In unconscious or unco-operative patients 30-50 ml. of 50% glucose IV. If vein not available, subcutaneous adrenaline 0.5 ml. of 1 : 1,000 solution, or Glucagon 1 mg. IM or IV will cause sufficient increase in blood sugar to allow the patient to become rational and co-operative. The hyperglycemic effect is however transient and supplementary carbohydrate must be given to prevent relapse. When recovery is slow, e.g, after overdose of insulin, constant infusion of 10% glucose is given to maintain the blood sugar.

2. *Conservative treatment and prevention of acute attacks*—(i) Diet—carbohydrate not more than 150 gms. in slowly absorbable form like cereals, bread, fruits and vegetables. Liberal protein because glucose derived from it is liberated slowly; fat to make up calories. In hepatogenic type bed-time meal to prevent early morning hypoglycemia. (ii) Restriction of physical exercise.
3. *Surgical measures*—Removal of islet cell tumors, or partial resection of pancreas in: (i) fulminating cases where convulsions are not controlled by glucose, (ii) severe chronic cases not controlled by diet, (iii) cases with marked neuropsychiatric symptoms
4. *Diazoxide*—may be effective in non-islet-cell tumors, leucinesensitivity, glycogen storage disease and idiopathic hypoglycemia of childhood. It possibly acts by preventing secretion of insulin in response to glucose. Daily dose 5-15 mg./kg. body weight. Side effects are anorexia, nausea, vomiting, oedema and excessive hair growth.

## 7. GLYCOSURIAS

**Causes:**

1. *Diabetes mellitus.*
2. *Potential diabetes*, i.e., those with glycosuria closely related to diet who become sugar-free with slight restrictions
3. *Renal glycosuria*—Glycosuria always present; blood sugar normal, ketosis during starvation rather than after dietetic excess, no symptoms, not progressive.
4. *Pregnancy glycosuria*—Due to lowering of renal threshold. Blood sugar estimation one hour after a meal liberal in carbohydrate will give blood sugar curve within normal range.
5. *Emotional glycosuria*—excessive mental strain, emotional excitement.

2. SPECIFIC TREATMENT—depends upon slow IV administration of adequate dose of clotting factors for a time depending on the clinical circumstances. As a general rule spontaneous bleeding can be controlled if patient's factor VIII level is increased above 20% of normal. But the level should be increased to about 50% before major surgery is contemplated, or if serious post-traumatic bleeding has already occurred. An adequate dose depends upon—(a) Patient's plasma volume, (b) resting coagulation factor level, (c) activity of material to be administered. One unit of factor VIII coagulant activity is that present in 1 unit of normal plasma, this is 100% activity. To bring the hemophilic with 1% activity and plasma volume of 2000 ml to 100% activity would require 2000 units of factor VIII.

   MATERIALS AVAILABLE—

   (a) *Cryoprecipitate*—is stored frozen. The contents need to be thawed on a 37°C water bath. The bag is suspended from a hook and the contents extracted with a 30 ml syringe and wide bore needle. There should be minimal delay since factor VIII coagulant is vary labile at room temperature.

   (b) *Factor VIII and factor IX concentrates*—are in lyophilized form and are brought into solution by adding required volume of water for injection to the vials

   Reactions—vary from transient flush or erythematous rash to severe bronchospasm or rarely collapse. In patients with history of reaction in past, lyophilized concentrate should be used.

3. *Corticosteroids*—diminish the activity of a circulating antibody active against antihemophilic globulin and lead to a better therapeutic effect with plasma transfusions.

4. *General care*—(i) *Employment*—Care in prevention of injury. (ii) *Dental hygiene*—to prevent need for tooth extraction. (iii) *Treatment of anemia*—with concentrated red cells. (iv) *Prophylactic immunization*—should be performed during period of lessened tendency to bleed. (v) *Drugs*—Use of aspirin in any form is contraindicated.

## Disseminated intravascular coagulation (DIC)

**Definition:** Intravascular coagulation implies thrombosis within the circulation. In DIC at one extreme there may be localised occlusive thrombus, whereas at the other there may be activation of all circulating coagulation factors with deposit of fibrin



Lumbar puncture needle.

*Difficulties* that may be encountered are—(1) *C.S.F. does not flow*—The position of the needle should be adjusted slightly or the stylet re-inserted to dislodge anything that may have blocked the lumen. (2) *Blood appears*—Sometimes the needle penetrates too far and comes in contact with the posterior wall of the vertebral body puncturing a vein The needle should be withdrawn a little, if much blood is present, it is advisable to repeat the puncture at a higher space. It is often helpful to collect the C.S.F. specimen into two parts of 2 to 3 ml. each for if the specimen is blood-stained, the appearance of more blood in one sample than the other suggests the blood is a contaminant, in subarachnoid hemorrhage bleeding is uniform. (3) *Dry tap*—In spite of the needle being in the subarachnoid space, no fluid may be obtained if there is a block at a higher level or the lumbar sac is filled with neoplastic tissue.

MANOMETRY—Before fluid collection is begun, fluid pressure measurements are taken with a manometer While the manometer readings are being taken, *Queckendstedt's test* may be performed by compressing the jugular veins in the neck and causing CSF pressure to rise in the manometer if there is no spinal cord block.

**Complications:** (1) *Headache*—may develop after a few hours and is due to continued leakage of fluid through the puncture wound in the theca producing lowered intracranial pressure. It is treated by making the patient to lie down, increasing fluid intake, analgesics and in severe cases ACTH 20 U once at night and 20 U next morning. (2) *Aggravation of root pains and signs of spinal cord compression*—in presence of intrathecal tumor. (3) *Infection*—producing meningitis. (4) *Coning*—may be a fatal complication if lumbar (or cisternal) puncture is performed in presence of raised intracranial pressure, the brain being pushed through the foramen magnum

gic state is increasing despite general and specific measures. Fresh frozen plasma (FFP) and platelet concentrates are satisfactory fractions. (c) Inhibition of excess fibrinolysis—if fibrinolysis is shown to be a major component by laboratory tests. Aminocaproic acid or Aprotinin.

**Hemolytic uremic syndrome**—Usually affects children under age of 3, occasionally adults. A week following gastroenteritis or upper respiratory tract infection, child presents with oliguria or anuria, anemia and purpura. Platelet count is very low and alteration of coagulation tests may suggest mild DIC. Renal impairment and hypertension common in survivors.

*Treatment*—Heparin, streptokinase, anti-platelet agents. Supportive therapy and peritoneal dialysis.

**Thrombotic thrombocytopenic purpura**—Uncommon condition affecting adults usually women. Often follows infection. Fever and abdominal pain followed by purpura and widespread (though transient) CNS manifestations. Spleen often slightly enlarged. Renal involvement with hematuria and uremia may occur. Gingival or skin biopsy shows capillary and arteriolar hyaline microthrombi. *Treatment*—Exchange transfusion or plasmapheresis or infusion of fresh frozen plasma.

### Idiopathic Thrombocytopenic Purpura (ITP)

**Etiology:** *Age*—common in children and young adults. *Sex*—more in females—4:3. Family history of bleeding not unusual but no sex-linked inherited trait. *Cause*—Probably autoimmune disease with platelet autoantibodies causing excessive platelet destruction.

**Clinical features:**

1. *Onset*—sudden with fever in acute variety. In chronic form, history of ready bruising or epistaxis over a variable period.
2. *Type and site of bleeding*—
   (a) Skin—Purpuric lesions in skin most common, ranging in size from pinpoint to pinhead ecchymoses, large purple areas and even hematoma.
   (b) Mucous membrane—(i) Epistaxis and bleeding from gums. (ii) Genito-urinary tract—Hematuria or menorrhagia in females (iii) Gastro-intestinal tract.
   (c) Excessive bleeding after injuries or operations.
   (d) Subconjunctival, retinal and rarely serious intracranial hemorrhages may occur.
3. *Symptoms due to anemia.*

## II. Chemical composition:

1. PROTEIN—Normal 20-40 mgm. per cent. *Increased*—in meningitis, encephalitis, poliomyelitis, disseminated sclerosis and neurosyphilis, spinal cord compression; also intracranial tumor and cerebral arteriosclerosis.

   *Increase of cells and protein without alteration of sugar and chloride values*—Virus encephalitis, brain abscess, subarachnoid hemorrhage, tumor, lead poisoning, aseptic meningeal reaction as in sinus thrombosis, lymphocytic choriomeningitis.

   *Colloidal gold test*—The proportion between gamma-globulin and other albumin fractions is the basis of this test. α-globulin causes precipitation of colloidal gold, whereas this is inhibited by albumin, gamma- and β-globulin. Serial dilutions of C.S.F. are prepared, treated with a solution of colloidal gold and allowed to stand overnight. Normal C.S.F. shows no precipitation. Three patterns of abnormal response are found—(1) *First zone or paretic curve*—maximum precipitation in the tubes containing the highest concentration of C.S.F. in dementia paralytica, subacute sclerosing leucoencephalitis (with normal C.S.F.), in cases of multiple sclerosis and meningo-vascular syphilis. Increased globulin is also found in gliomas, collagen diseases, carcinoma, post exan-

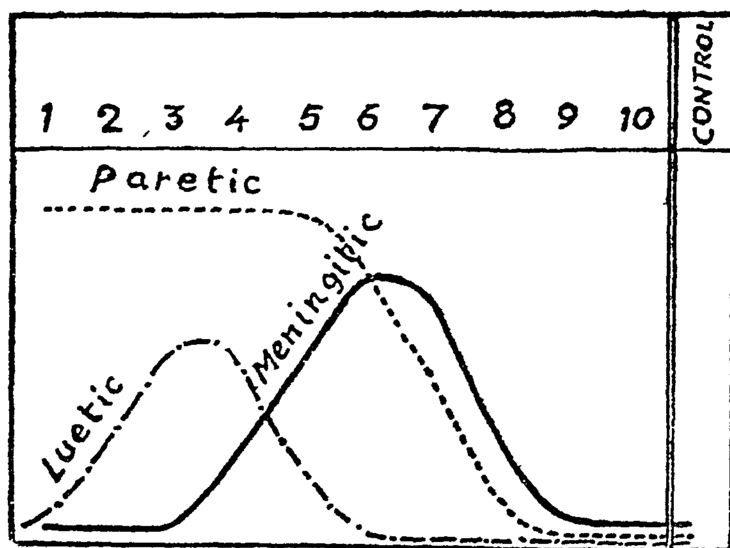



Fig 61 Chart to show three types of Lange colloidal gold curve. In test tube 1 the C.S.F. is present in a concentration of 1 : 10 and in each subsequent tube it is progressively reduced to half so that in the 10th tube it is 1 : 5120.

3. IMMUNOSUPPRESSIVE THERAPY—drugs such as azathioprine or cyclophosphamide are sometimes used in patients who are refractory to splenectomy and steroids.

**Secondary thrombocytopenia**—Much more common than primary form.

*Causes*—(1) *Drugs and chemicals*—(a) *Decreased production*—Thiazide diuretics, ethyl alcohol, oestrogens. (b) *Increased destruction*—by an immune mechanism—Sulphonamides, quinidine, quinine, sedormid, digitoxn, PAS. (c) *Mechanism uncertain*—Gold, chloramphenicol, penicillamine. (2) *Reticuloses.* (3) *Leukemias.* (4) *Aplastic anemia.* (5) *Bone marrow infiltration.* (6) *Hypersplenism*—(a) Primary or idiopathic. (b) Secondary—Portal hypertension with congestive splenomegaly, malignant lymphomas, Felty's syndrome, Gaucher's disease, sarcoidosis, chronic malaria, kala-azar, tuberculosis, chronic lymphatic leukemia, thalassemia. (7) *Systemic lupus erythematosus.*

*Clinical features*—Presence of lymph node enlargement, marked splenomegaly, bone tenderness, fever, anemia out of proportion to degree of bleeding and markedly increased sedimentation rate suggest secondary rather than primary thrombocytopenia.

*Management*—Primarily that of underlying cause. If bleeding is severe, corticosteroids can be used and if it is life-threatening, platelet transfusion can be used in addition.

## 3. AGRANULOCYTOSIS

**Causes:**

A. PRIMARY OR IDIOPATHIC.

B. SECONDARY—

1. Drugs—(a) *Cytotoxic agents*—Alkylating agents, antimetabolites. (b) *Phenothiazine-like compounds*—(i) Phenothiazines—Chlorpromazine, promazine, mepazine. (ii) Antithyroid drugs. (iii) Sulphonamides. (iv) Antibiotics—Ampicillin, methicillin. (c) *Pyrazole-like compounds*—Amidopyrine, phenylbutazone. (d) *Idiosyncratic drugs*—Indomethacin, procainamide, phenylbutazone, chloramphenicol.
2. X-rays and radium and radioactive phosphorus.
3. Severe infections—osteomyelitis, Vincent's angina, acute liver abscess, pneumonia, renal disease, septicemia, influenza, kala-azar, etc.

Table showing cerebro-spinal fluid picture in some diseases.

| Test | Normal | Meningitis | | | | Brain abscess | Syphilis | | | Subarachnoid hemorrhage | Spinal tumor |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pyogenic | T.B. | Virus | Fungal | | Meningo-vascular | Tabes | G.P.I. | | |
| *Appearance* | Clear and colourless | Turbid | Clear or slightly opalascent | Usually clear | Clear | Clear | Clear and colourless | Clear and colourless | Clear and colourless | Turbid or frothy blood-stained | Yellowish if complete block, slightly yellow or clear if incomplete |
| *Pressure* | 60–150 mm water | Raised | Raised | Raised | Raised | Raised | Usually normal | Usually normal | Usually normal | Raised | Diminished |
| *Total protein* | 15–30 mg./100 ml. | Markedly increased | Markedly increased | Increased | Markedly increased | Increased | Increased | Increased | Increased | Greatly increased | Greatly increased |
| *Lange curve* | Negative | Meningitic | Meningitic | May be paretic i.e. polio | Meningitic | Negative | May be paretic or luetic | Luetic | Paretic | Variab'e | Normal or luetic or meningitic |
| *Sugar* | 50–70 mg./100 ml. | Markedly reduced or absent | Reduced | Normal | Reduced | Normal | Normal | Normal | Normal | Normal | Normal |
| *Chlorides* | 720–750 mg/100 ml. | Reduced | Reduced | Normal | Reduced | Normal | Normal | Normal | Normal | Normal | Normal |
| *Cells* | 0–5 lymphocytes per c.mm. | Large number of polymorphs | 50–500 per c.mm. lymphocytes predominant | Lymphocytes increased | Lymphocytic pleocytosis | 100–200 per c.mm, many lymphocytes | Lymphos increased | Lymphos increased | Lymphos increased | Large number of red cells | Usually normal |
| *Bacteriology* | Sterile | Causal organism isolated | Myco. tuberculosis | Sterile | Cryptococci on stained smear and isolated on culture | Sterile | Sterile W R. usually positive | Sterile W R usually positive | Sterile W.R invariably positive | Sterile | Sterile |

## 4. POLYCYTHEMIA RUBRA VERA (PRV)

**Definition**—Chronic myeloproliferative disease in which there is excessive red cell production by a hyperplastic bone marrow. This leads to increased red cell mass, packed cell volume and red cell count.

**Clinical features:** Symptoms are due to increased blood viscosity and haemorrhagic tendency.

*Age and sex*—Incidence highest in men between ages of 40-70.

*Onset*—Usually insidious, most commonly with cerebral symptoms.

*Skin and mucous membrane*—Dusky flush, cyanosis of distal portions of extremities with swelling and pain (erythromelalgia), ecchymoses, deep red colour of mucous membrane, epistaxis, blood shot eyes. The plethoric appearance of the face, as well as all symptoms are exaggerated in cold weather.

*Cardiac*—Angina pectoris, myocardial infarction, breathlessness, cardiac failure.

*Vascular*—Vascular accidents—Venous thrombosis, claudication. Gaisbock's syndrome—polycythemia and hypertension without splenomegaly.

*Gastro-intestinal system*—Dyspepsia, flatulence. Duodenal ulcer may occur. Hemorrhage from varices. Thrombosis of mesenteric veins and portal thrombosis. Splenomegaly in two-thirds of cases, usually moderate. Its presence helps to differentiate primary from secondary polycythemia. Hepatomegaly slight or moderate often. Abdominal pain especially in the left upper abdomen due to perisplenitis.

*Respiratory system*—Dyspnoea, massive hemoptysis or hemothorax.

*Genito-urinary*—Vesical, vaginal or uterine bleeding.

*Cerebral*—Headache, dizziness, insomnia, numbness and tingling, psychic disturbances, ringing in the ears, hemiplegia and epileptiform attacks.

*Visual*—Transitory dimness of vision, diplopia. Fundus—congested and tortuous vessels.

*Bones*—Often severe bone pains due to pressure by the hyperplastic marrow, may be particularly severe after a hot bath.

*Gout*—may be due to increased cell turn over and consequent cell destruction.

*General*—Weakness, lassitude, fatigue, pruritus.

Once language is formed, the formulated language must be transmitted anteriorly by means of subcortical association fibres to the cortical area of expression just anterior to the motor cortex (Broca's area).

**Clinical assessment of dysphasia:**

1. *History*—Patient's native language and handedness and educational status.
2. *Conversational testing*—spontaneous speech: (a) Non-fluent aphasics: Here there is decreased output to 10 or less words per minute accompanied by increased effort in production of words, dysarthria, and short phrase length. The lesion is anterior to fissure of Rolando (b) Fluent aphasia. Here the output of words may reach 200 words per minute. Effortless speech with no dysarthria, but accompanied by paraphasia. Paraphasia is a substitution within a language which may be literal (replacement of syllable), verbal (replacement of word), or substitution of a meaningless nonsense word (neologism). Patient with fluent aphasia is unaware of the substitutions.
3. *Repetition of spoken language*—Repetition is disproportionately poor in conduction dysphasia. In the uncommon transcortical dysphasias repetition is excellent despite other language defects.
4. *Naming*—Difficulty in naming is useful in establishing dysphasia, though it does not help to localise the lesion further as it occurs in varying degree in all forms of dysphasia.
5. *Reading and writing*—Disturbances of reading (alexia) and writing (agraphia) are usually part of a more generalised aphasia. Alexia with agraphia is due to damage to left angular gyrus. Pure agraphia with little or no speech defect occurs with left parietal lesion. Co-existence of dysgraphia, dyscalculia, finger agnosia, and right-left disorientation indicates a lesion of left angular gyrus.

**Types of aphasia:**

1. BROCA'S APHASIA—results from damage to posterior part of inferior frontal gyrus. Speech is slow, laboured, poorly articulated and reduced to a few words (telegraphic). Comprehension is little impaired.
2. WERNICKE'S APHASIA—differs from Broca's aphasia in that comprehension is severely impaired. It results from posterior lesions of superior temporal gyrus. Speech is

450 ml.) may have to be removed in rapid succession. Emergency plasmapharesis may be succeeded on following days by conventional phlebotomies until hematocrit is at safe level.

3. *Reduction of activity of bone marrow*—(a) *Radioactive phosphorus*—if repeated venesection is required to maintain a normal hematocrit. 4-6 millicuries of $^{32}P$ injected I V. If after 3 months red cell count is above 6 million, or platelet count at dangerously high level, second dose of 1-4 millicuries. Remission after $^{32}P$ usually lasts for 1-2 years. Dangers of over-dosage are agranulocytosis and thrombopenia, hemorrhages, testicular and sometimes renal damage. (b) *Busulphan*—if $^{32}P$ not available. Dose for average adult 4-6 mg. daily. Maintenance dose 1-2 mg. daily. Less satisfactory for long-term control.

## 5. LEUKAEMIAS

**Definition:** A clone of malignant cells derived from myeloid or lymphoid stem cells. In acute leukemia the clones are primitive (blast cells) in type, whereas in chronic leukemia the abnormal cells retain most of the features of their normal counterpart In children 85% of leukemias are of lymphocytic type; in adults acute myeloid leukemia is the most common type

*Cause*—Apart from exposure to radiation the cause of leukemia in man remains unknown.

### Acute Leukemias

**Classification:**

1. ACUTE MYELOID LEUKEMIA (AML)—involves the myeloid series It can be subdivided using morphological criteria:
   MO Undifferentiated (AUL).
   M1 undifferentiated with few cells differentiated (AUL).
   M2 Acute myeloblastic leukemia (AML).
   M3 Promyelocytic leukemia (AProL).
   M4 Acute myelomonoblastic leukemia (AMML).
   M5 Acute monoblastic leukemia (AMoL).
   M6 Erythroleukemia (EL).
2. ACUTE LYMPHOBLASTIC LEUKEMIA (*ALL*)—involves the lymphatic series It can be subdivided on basis of immunological surface membrane characteristics and measurement of certain enzymes—

*Common ALL*—The leukemic blasts have characteristics of neither T nor B lymphocytes but react with anti-serum against non-T and non-B ALL.

5. *Myasthenia gravis*—Early stage—speech slurred with nasal twang occurring only when patient has been speaking for long. Later—persistent dysarthria and aphonia.

## 4. THE CRANIAL NERVES

I. **Olfactory nerve**—Paralysis causes anosmia.

*Causes*—1. Local causes such as catarrh, rhinitis, nasal polypi. 2. Head injury. 3. Compression of olfactory tract by tumor (usually meningioma), basal meningitis. 5. Tabes. 6. Refsum's disease. 7. Idiopathic.

II. **Optic nerve** (Fig. 6.2.)



Fig. 6 2 Visual pathways showing various sites of interruption and the abnormal field defects thus produced.

1. LESIONS OF OPTIC NERVE—*Unilateral central scotoma*—(a) Vascular lesions—retinal hemorrhage, occlusion of a branch of central retinal artery. (b) Demyelination.

cells. Marrow often entirely replaced by myeloblasts and promyelocytes. Positive Sudan Black reaction.

*ALL*—(1) *Total white cell count*—More than 50,000 blast cells/c.mm. (less than 1,000 white cells if aleukemic leukemia). (2) *Bone marrow*—Hypercellular marrow with depression of normal erythropoiesis, granulopoiesis and thrombopoiesis. As compared to myeloblastic leukaemia the nuclei are round, the cells smaller, the nuclear/cytoplasmic ratio higher, and the number of nucleoli fewer.

**Differential Diagnosis:**

1. *The two types of leukaemias*—are clinically indistinguishable except that in ALL there is a slightly greater tendency to lymphadenopathy. The clinical features of various subtypes of AML are similar, but patients with acute monocytic or myelomonocytic leukaemia may present with swollen gums, and those with acute promyelocytic leukaemia with a severe hemorrhagic disorder due to disseminated intravascular coagulation. T-cell leukaemia is predominantly a disease of males and is often associated with presence of a mediastinal mass.
2. *Infectious mononucleosis*—Blood film shows pleomorphic mononuclear cells, but haemoglobin and platelets usually normal.
3. *Idiopathic thrombocytopenic purpura*—No organomegaly. Leucocytes normal.
4. *Aplastic anaemia*—No organomegaly.

**Treatment:**

ACUTE MYELOBLASTIC LEUKAEMIA—(1) *Chemotherapy*—Intermittent, intensive, combination chemotherapy with daily or 12-hourly thioguanine and cytosine arabinoside, or Cyclophosphamide, Vincristine, Cytosine Arabinoside, and Prednisolone (COAP) until marrow is hypoplastic, or 5-day courses of Cytosine Arabinoside and one injection of Daunorobicin with 5-day treatment free interval. CNS prophylaxis—Routine cranial irradiation is not indicated but intrathecal methotraxate or cytarabine should be given. (2) *Supportive care*—(a) Transfusion of packed red cells for anaemia and platelet concentrates if bleeding. (b) Treatment of infection—with broad spectrum antibiotics. Platelet transfusion—Fresh ABO compatible platelet transfusion of value in treating haemorrhage *Maintenance therapy*—5-day courses of TRAP [Thioguanine, Rubidomycin, Cytosine Arabinoside (ARA-C), and Prednisolone] COAP and POMP (Purinethol, Oncovin, Methotraxate, Predni-

2 At *base of brain*—Meningeal affections—Tuberculous, bacterial and fungal meningitis, carcinomatous infiltration of meninges, meningovascular syphilis. Direct neoplastic invasion from sinuses and nasopharynx, Guillain-Barre syndrome, sarcoid and herpes zoster.

3. *Lesions at petrous tip*—Mastoiditis or otitis media may cause diffuse inflammation of petrous bone with combination of 6th, 7th and 8th nerve palsies (Gradenigo's syndrome).

4 *Lesions in region of cavernous sinus*—Cavernous sinus thrombosis (6th nerve most vulnerable), intrasellar tumors such as chromophobe adenomas (3rd nerve). Aneurysmal dilatation of intracavernous portion of carotid artery, carotico-cavernous fistula.

5. *Lesions at superior orbital fissuer and orbital apex*—Neoplasms such as meningiomas.

V. **Trigeminal nerve:**

MOTOR—(a) *Peripheral lesions* (between pons and Gasserian ganglion). All three divisions may be affected giving rise to: Weakness and wasting of muscles of mastication on affected side with deviation of jaw towards the affected muscles.

Causes—(i) Between pons and trigeminal ganglion: Inflammatory lesions such as meningitis, compression by tumor or aneurysm, degeneration as in tabes. (ii) Trigeminal ganglion—Tumors, e.g., meningioma, acoustic neuroma, fracture of middle cranial fossa, Gradenigo's syndrome (with 6th nerve), herpes zoster. (iii) After leaving the ganglion—Cavernous sinus or superior orbital fissure lesions, fracture of bones of face.

(b) *Central lesions*—Weakness of muscles of mastication with paralysis of external rectus and of face on affected side.

Causes—Tumors, syringobulbia, and vascular lesions involving pons, medulla, and uppermost cervical segments of spinal cord.

SENSORY—1. Impaired or absent corneal reflex. 2 Loss of sensation of half of face and scalp to light touch, pain and temperature but not to deep pressure pain. Also of palate, and nose. Sensation of broken cup when patient drinks 3. Taste may be impaired on anterior two-thirds of tongue. 4. Diminished secretion of tears and saliva on affected side. 5. Excessive furring of tongue on affected side.

6 *Bone pain*—due to extension of hemopoiesis throughout the long bones. Sternal tenderness.

7. *Lymphadenopathy*—rare.

8. *Other features*—(a) Acute abdominal pain following splenic infarct (b) Symptoms caused by infiltration of extra-medullary tissues—cranial nerve palsies, paraplegia. Leucocytic infiltration of fundus (c) Gout. (d) Priapism.

**Investigations**—(a) Total leucocyte count above $30 \times 10^9$/litre (usually 100–250 × $10^9$/litre (b) Differential—greatly increased absolute number of neutrophils, metamyelocytes, myelocytes, promyelocytes and blast cells. (c) Platelets usually increased (d) Neutral alkaline phosphate (NAP) score very low or zero (e) Serum alkaline phosphatase may be raised. (f) Serum $B_{12}$ and $B_{12}$ binding protein high. (g) Bone marrow aspiration and trephine—for marrow cell morphology and enumeration of blast cells.

COURSE. of the disease—(1) *Initial chronic phase*—Symptoms are alleviated by treatment and spleen reduces in size. (2) *Phase of transformation*—Disease becomes more aggressive with enlarging spleen, rising leucocyte count or rising proportion of blast cells in peripheral blood. Bone pain or haemorrhages from various sites. In about 20% transformation occurs abruptly (blast crisis).

**Management:**

1. *Chemotherapy*—(a) *Busulphan* (Myleran)—drug of choice. Dose—4 mg daily by mouth. When white cell count comes down to about 50,000 per c.mm. the dose is decreased to 2 mg. Subsequently the dose may be reduced to 2 mg. on alternate days or every third day the object being to keep the white cell count between 10,000 and 20,000 per c.mm. Most patients can be kept under control with busulphan for several years. Side effects pulmonary fibrosis and skin pigmentation Resistance to busulphan may suggest impending blast crisis (b) *Hydroxyurea* (Hydrea)—useful alternative drug to busulphan. Bone marrow suppression is not so prolonged Useful for patients resistant of busulphan.
2. *Radiotherapy*—may be useful when a spleen remains persistently enlarged while the disease otherwise appears to have responded to chemotherapy.
3. *Splenectomy*—in transformation phase for easier support of the patient with blood products.

| Site of lesion | Possible causes | Associated features |
|---|---|---|
| TEMPORAL BONE LESION: (a) *Region of geniculate ganglion* (Fig 6.3-3) | Trauma, herpes zoster of geniculate ganglion (Ramsay Hunt syndrome) Spread of infection from middle ear or mastoid | Variable deafness, vertigo. Defective lacrymal secretion. Loss of taste on anterior 2/3 of tongue. |
| (b) *Between geniculate ganglion and nerve to stapedius* (Fig. 6-4a) | Spread of infection from middle ear. Trauma | Loss of taste on anterior 2/3 of tongue. Hyperacusis Impaired salivary secretion. |
| (c) *Between branching of n to stapedius and chorda tympani n* (Fig. 6.3-4b) | " " " | Loss of taste on anterior 2/3 of tongue. |
| (d) *Within stylomastoid foramen* (distal to branching of chorda tympani n.) (Fig. 6.3-4c) | Bell's palsy, suppurating glands, encephalitis, tetanus, infective polyneuritis, otitis media, mastoidectomy. | Facial paralysis only. |
| EXTRACRANIAL (Fig. 6 3-5) | Tumour or inflammation of parotid gland Trauma | Paralysis of some facial ms. only. |

**Bilateral lower motor neurone facial palsy—**

*Causes*—Acute infective polyneuritis, leprosy, leukemia, syphilitic or meningococcal meningitis, double otitis media, rheumatic, post-diphtheritic, Bell's palsy, sarcoidosis, uveoparotid paralysis.

*Signs*—Flattening of all normal folds, sagging of corners of mouth, fixed expression-less mask like face, no voluntary movements of facial muscles. Whites of eyes seen when patient attempts to close them. Patient talks as if he had severe stomatitis.

**Bell's palsy:**

DEFINITION—In great majority of acute apparently isolated lower motor neurone facial palsy no cause can be found and it is to this category that the term Bell's palsy is now usually confined.

ETIOLOGY—(a) *Age*: any (b) *Sex*: Both sexes equally affected. (c) *Associated known clinical conditions*—Diabetes, severe hypertension, last trimester of pregnancy, dental anaesthesia.

of white cell count, haemoglobin and platelets. When white cell count falls below 25,000/c.mm., dose reduced to maintenance level of 2-4 mg. daily. The drug should be discontinued when white cell falls below 5,000-10,000/c mm., or (b) *Cyclophosphamide*—2-3 mg./kg. IV daily for 6 days or 50-100 mg. orally 1-3 times daily causes less platelet depression than other drugs and may be used when other agents have produced thrombocytopenia.

2. *Radiotherapy*—for local treatment of large glandular masses particularly if they are producing symptoms.
3. *Corticosteroids*—If anaemia or thrombocytopenia 60 mg. prednisolone daily by mouth, dose reduced as soon as Hb concentration and platelet count improve.
4. *General supportive measures*—(i) Blood transfusion in patients with marrow failure resistant to treatment. (ii) Antibiotics for infections particularly for patients treated with prednisolone. (iii) Gammaglobulin by injection may be given regularly to correct deficiency of gammaglobulin.

## 6. LYMPHOMAS

**Definition**—The lymphomas or reticuloses consist of a group of diseases characterised by enlargement of lymph glands, splenomegaly, greater or lesser degree of constitutional disturbance and ultimately fatal outcome.

**Classification:**

1. Hodgkin's disease.
2. Non-Hodgkin's lymphomas (NHL)—Rappaport's classification—
   (1) *Nodular*—Lymphocytic, well differentiated. Lymphocytic, poorly differentiated. Lymphocytic and histiocytic.
   (2) *Diffuse*—Lymphocytic, well differentiated (including CLL). Lymphocytic, poorly differentiated. Lymphocytic and histiocytic. Undifferentiated (stem cell, including Burkitt's lymphoma).

### HODGKIN'S DISEASE

**Etiology:** (a) *Age incidence*—Bimodal with peak incidence at 25 and another at 70. (b) *Sex*—More in males. (c) *Cause*—Unknown. A hypothesis is that the disease in its early stages represents a protracted immunological response to a viral agent which then undergoes neoplastic transformation.

ponents difficult. Naso-labial fold flattened out. Angle of mouth on affected side droops with dribbling of saliva (Orbicularis oris, sphincter of oral fissure).

4. Cheek puffs out with expiration because of buccinator paralysis. Food collects between teeth and paralysed cheek. Fluid runs out while drinking (Buccinator).
5. Base of tongue lowered (stylohyoid and posterior belly of digastric).

   *Electrodiagnostic tests*—from fourth day onwards can differentiate between conduction block and nerve degeneration Most patients with conduction block (about 80%) recover completely.

MANAGEMENT of Bell's palsy:

1. *Local heat*—Infra-red irradiation or moist heat or short wave diathermy over face or parotid region or both if there is tenderness of nerve trunk.
2. *Local treatment of muscles*—(a) The patient should massage the facial muscles with bland oil twice daily for 5 minutes. The massaging movements should start from the chin and lower lip and be directed upwards. With return of function the patient should practise movements of various muscles of face before a mirror. (b) Prevention of facial sagging—application of strips of adhesive tape to lift up the angle of the mouth. The tape is attached to the temple and extends down in a V shaped fashion to the upper and lower lips.
3. *Protection of eye*—with dark glasses or eye patch. The eye should be washed twice daily with mild zinc-boric solution to prevent conjunctivitis.
4. *Corticosteroids*—if seen within a week of the onset. Help by reducing secondary oedema. Prednisolone 40 mg daily for 4 days, reduced over next 6 days.
5. *Galvanism*—2 weeks after onset of paralysis three times a week. Do not give if face is tender; stop if involuntary contractions of facial muscles develop.
6. *Surgery*—Decompression of facial nerve in second or third week cannot influence favourably natural course of Bell's palsy. In cases which fail to recover after 9 months anastomosis of facial with accessory or preferably hypoglossal nerve may be considered, or plastic surgery in cases of total paralysis with atrophy of musculature.

IV. *Due to immunologic changes*—(a) Lowering of resistance to infection. (b) Hemolytic anaemia.

**Diagnosis:**

1. OF THE DISEASE: Lymph node biopsy shows characteristic histology—(a) Presence of Reed-Sternberg cells (absence does not rule out Hodgkin's disease). (b) Pleomorphic pattern of cell types—lymphocytes, eosinophils and stroma—which destroys normal architecture of the gland.
2. OF THE EXTENT OF DISEASE: for appropriate therapy.
3. IDENTIFICATION OF INTRA-ABDOMINAL DISEASE—(a) *Lymphangiography*—of abdominal lymph nodes although helpful, as a preliminary to laparotomy, does not reveal involvement of the upper abdominal lymph nodes, the splenic hilar nodes, or the mesenteric nodes. (b) *Laparotomy*—advised for patients who are found clinically to have stage IA or B, stage IIA or B, and stage IIIA disease.

*Stage I*—Involvement of a single lymph node region (I) or of a single extra lymphatic organ or site (IE).

*Stage II*—Involvement of two or more lymph node regions on the same side of the diaphragm (II) or localised involvement of extralymphatic organ or site and of one or more lymph node regions on the same side of the diaphragm (IIE).

*Stage III*—Involvement of lymph node regions on both sides of the diaphragm (III) which may be accompanied by localised involvement of extralymphatic organ or site (IIIE) or by involvement of the spleen (IIIS) or both (IIISE).

*Stage IV*—Diffuse or disseminated involvement of one or more extralymphatic organs or tissues with or without associated lymph node enlargement.

Each stage is subdivided into A and B categories, A for those without symptoms and B for those with unexplained weight loss greater than 10% of body weight, unexplained fever above 38°C and night sweats.

**Differential Diagnosis:** See D.D. of Lymphadenopathies

**Treatment:**

1. RADIOTHERAPY—most effective for localised Hodgkin's disease in Stages I and II if in addition to irradiating the involved areas, the adjacent involved lymph nodes are also treated. Complications of radiotherapy—(a) Hematological depression with anaemia, thrombocytopenia and increased liability to infection. (b) Radiation pneumonitis if some lung has to be included (c) Acute and chronic

*Spinal branch*—Paralysis of sternomastoid (weakness of rotation to opposite side) and of upper fibres of trapezius (lowering of shoulder, winging of scapula).

Causes—(a) Nuclear lesions—Poliomyelitis, motor neurone disease, syringomyelia, cervical spinal cord tumors. (b) Lesions of nerve trunk— (i) Within posterior fossa— Tumors near jugular foramen, granulomatous meningitis or basal carcinoma (usually with 9th, 10th and 12th nerves). (ii) After exit from the skull—Compression by enlarged deep cervical glands, or injury by penetrating wounds or during operations in cervical region.

XII. **Hypoglossal nerve:**

1. *Unilateral paralysis*—Wasting of tongue. Tongue becomes sickle shaped with concavity on paralysed side. Deviation towards paralysed side on protrusion.
2. *Bilateral paralysis*—Marked wasting, protrusion not possible. Fasciculations if progressive bulbar paralysis. Dysarthria. In pseudobulbar palsy tongue is somewhat smaller than normal owing to spastic contraction of the muscles.

Causes—Unilateral lower motor neurone lesions—(i) Hypoglossal nucleus or fibres of the nerve in the course through medulla—Poliomyelitis, syringobulbia, thrombosis of median branches of vertebral artery. (ii) Between medulla and hypoglossal canal—Glomus tumor, meningioma or aneurysm of vertebral artery, granulomatous or carcinomatous meningitis. Congenital anomalies in neighbourhood of foramen magnum e.g. basilar impression. Periostitis of hypoglossal canal. Rarely head injury.

*Bilateral lower motor neurone lesion*—Progressive bulbar paralysis.

*Bilateral upper neurone paralysis*—Pseudobulbar palsy due to double hemiplegia, multiple sclerosis, motor neurone disease, tumors of brain stem.

## Trigeminal Neuralgia (Tic Douloureux)

**Definition**—A functional disorder of the sensory division of the trigeminal nerve characterized by unilateral, intermittent, brief, lancinating pains in the face.

**Etiology:** Age—usually after middle age. Sex—more common in females. *Cause*—unknown. May entail a fault in the

## 7. MYELOMATOSIS

**Definition**—Multiple myeloma is a disseminated malignancy. of plasma cells. It is characterised by—(1) Presence of paraproteins. (2) Presence of neoplastic tissue cells within the bone marrow. (3) Destruction of bone. A diagnosis can be made even when only two of these features are present.

**Clinical features:**

1. *Bone pain*—Commonest presenting symptom is skeletal pain, most commonly involving thoracic and lumbar spine and aggravated by jolting. Girdle pains may occur as also pathological fracture.
2. *Symptoms due to hypercalcemia*—Anorexia, nausea, constipation, polyuria.
3. *Symptoms due to anaemia*—from bone marrow involvement, infection, uraemia, bleeding.
4. *Neurological symptoms*—Progressive weakness of lower limbs with bladder dysfunction may be produced by extra-osseous myeloma tissue pressing on the spinal cord.
5. *Renal failure*—may result from hypercalcemia, pyelonephritis, hyperviscous impairment of renal blood flow, tubular blockage by proteinaceous casts, uric acid nephropathy, or amyloidosis.
6. *Bleeding*—from various sites due to thrombocytopenia.
7. *Symptoms of hyperviscosity*—Lassitude, confusion, coma, blindness, bleeding, infection, renal failure, CCF, hypertension.

**Diagnosis**—(1) *Paraproteins*—in serum in 80%, in urine (Bence-Jones) in 20%. (2) *Bone marrow biopsy*—Plasmocytosis. (3) *Radiographs*—(a) Skull—Typical punched out holes with no osteoblastic rim (lytic lesions), (b) Ribs—show subpleural extension.

**Treatment:**

1. *Specific*—Melphalan (Alkeran) 2 mg/day continuously. Prednisolone may be added in older patients but should be discontinued as soon as remission is achieved (50% reduction in paraproteins). (2) VMCP—Indications—Patients under 50 with fast growing tumours, only Bence Jones protein, IgD or non-paraprotein myelomas. Vincristine 1 mg IV followed by Melphalan 5 mg plus Cyclophosphamide 100 mg plus Prednisolone 60 mg for 4 days. Whole course to be repeated after 3-weeks interval. As soon as remission is obtained, vincristine and prednisolone should be stopped and other drugs continued as long as paraprotein levels continue to fall.

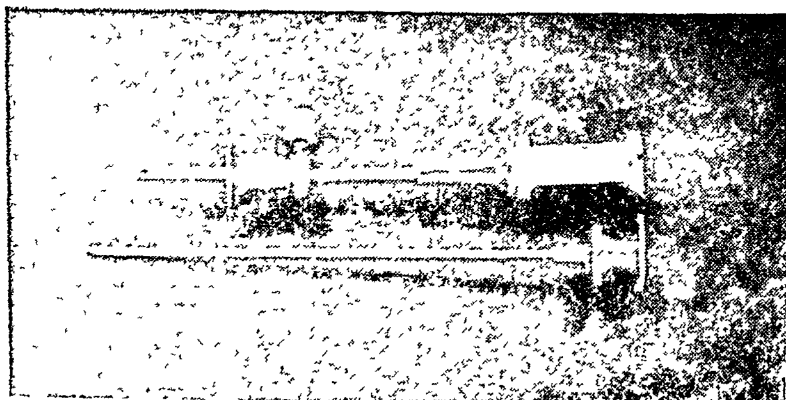
of compression of trigeminal root or ganglion e g. meningioma, acoustic neuroma, aneurysm of basilar artery, arteriovenous malformations, basilar invagination, epidermoid cholesteatomas in the cerebellopontine angle, as a result of Paget's disease or osteomalacia. (b) Paratrigeminal neuralgia—Severe pain in and around one eye accompanied by Horner's syndrome on the affected side. It is continuous and progressive and is usually caused by a structural lesion, often malignant, in the base of the skull involving the paratrigeminal region. (c) Multiple sclerosis—Diagnosis of multiple sclerosis should always be suspected in a young patient with trigeminal neuralgia. (d) Syringobulbia.

2. *Other causes of facial pain*—Pain due to sinusitis, toothache, aural infection, and temporo-mandibular arthralgia can be diagnosed by proper clinical and radiological assessment.
3. *Migrainous neuralgia*—Episodes of severe and continuous pain, often burning in character in or behind one eye or in cheek, forehead and temple. Often suffusion of conjunctiva and blocking of nostril on affected side.
4. *Herpes zoster and post-herpetic neuralgia*—Pain continuous in nature. Vesicles and scars of herpetic infection.
5. *Glossopharyngeal neuralgia*—Pain in tonsillar fossa, back of throat and larynx; may radiate to ear on affected side. Swallowing is the stimulus most likely to produce pain.
6. *Atypical facial pain*—Intermittent but long-lasting pain of aching character which affects the cheek and upper jaw, often bilateral and occurs almost exclusively in young and middle-aged women. Generally believed to be a manifestation of depression or anxiety.
7. *Clonic facial spasm*—Sometimes painful, usually associated with intermittent twitching of eyelid and face on one side. Platysma usually involved in twitching.
8. *Neuralgic pain occasionally associated with facial hemiatrophy.*
9. *Idiopathic trigeminal neuropathy*—Commonly associated with muscle wasting of masseter.

CONTRAINDICATION—Hemophilia and allied disorders of coagulation.

**Method:** Marrow aspiration and trephine are both complementary and maximum information can be obtained if both techniques are used together. Although inferior to aspirate for identification and study of fine morphological details of individual marrow cells, trephine biopsy provides a larger amount of marrow for examination. Quantitation of some cell types (e.g., megakaryocytes) is more reliable and granulomatous lesions and marrow infiltration by lymphoma or carcinoma are also more likely to be detected.

TECHNIQUE—(1) *Marrow aspiration* is done with bone marrow aspiration needle. The skin, subcutaneous tissue and periosteum over the posterior iliac crest (or manubrium sterni) are infiltrated with 2% procaine. The marrow needle is pushed through the bone with a boring motion, the guard being kept at a distance of about 1 cm. above the surface of the skin. When the needle has entered the marrow, the stillete is withdrawn and a long 1 ml. syringe attached, marrow juice drawn off and smeared onto glass slides. In selected patients, residual aspirate is placed in appropriate specimen containers for chromosomal analysis, microbiological culture, cell culture and electron microscopy. (2) *Marrow trephine*—Immediately on completion of the aspiration, a trephine biopsy (with a Jamshidi-Swaim needle) of an adjacent area of bone is performed through the same puncture site. After expulsion of 2 cm. core of bone and its enclosed marrow from the needle, the biopsy specimen is smeared gently across three glass slides and then placed in fixative for subsequent histopathological processing and staining.



Bone marrow aspiration biopsy needle

## 5. THE PUPILS

### Importance of observation in diagnosis

1. *Position*—may be congenitally eccentric. Sometimes ectopic pupil in midbrain lesions.
2. *Irregularity*—Slight irregularity (anisocoria) may occur in (i) healthy subjects, (ii) coloboma, operative procedures, synechiae or acute glaucoma, (iii) GPI or some other form of neuro-syphilis.
3. *Inequality*—(i) Encephalitis sometimes. (ii) Intracranial hemorrhage. (iii) Aneurysm of aorta. (iv) GPI. (v) Third nerve lesions The abnormal pupil will be smaller when it is dilated and larger when it is constricted.
4. *Dilatation* (Mydriasis)—(i) Stimulation of sympathetic, e.g. cervical rib or irritative lesions in neck, aortic aneurysm, mediastinal tumor. (ii) Paralysis of para-sympathetic, e g. 3rd nerve palsy. (iii) Asphyxia and deep anaesthesia. (iv) Epilepsy. (v) Drugs—atropine, belladona, cocaine, datura poisoning, glutethimide or amphetamine overdosage. Mydriatic drops. (vi) Optic atrophy producing blindness. (vii) Anxiety. (viii) Glaucoma.
5. *Constriction* (Miosis)—(i) Paralysis of sympathetic—Horner's syndrome due to lesions of cervical cord especially involving $C_8$ and $T_1$, or lesions of cervical sympathetic trunk, e.g. trauma, growth, Pancoast's tumor, or intracranial syphilis. (ii) Irritation of sympathetic, e.g. intracranial growth or abscess. (iii) AR pupil. (iv) Drugs—morphine and its products, pilocarpine, physostigmine. (v) Pontine hemorrhage. (vi) Syringomyelia. (vii) Transient after excision of Gasserian ganglion. (viii) Iritis. (ix) Organophosphorus poisoning. (x) Old age (senile myosis).
6. *Dilated pupil fixed to light*—(i) Mydriatic drugs like atropine, hyoscine or homatropine. (ii) Glaucoma. (iii) Contusion of eyeball. (iv) Lesion anterior to lateral geniculate body Dilated fixed pupils with loss of upward gaze in Parinaud syndrome.
7. *Argyll-Robertson pupil*—(i) Miosis, generally bilateral. (ii) Irregular. (iii) Does not react to light either directly or consensually. (iv) Reaction to accommodation is instantaneous (v) Reacts slowly and unevenly to atropine or homatropine. (vi) Stroma of iris may show loss of

5. *Fresh blood*—In anemic patients suffering from deficiency of factors which deteriorate during blood storage—hemophilia and patients suffering from factor V deficiency.

SELECTION OF DONOR:

1. Age—between 15-65 years.
2. No heavy meals within previous 2 hours of being bled.
3. Reject donor with syphilis or malaria, allergic disease, or infective hepatitis during previous 12 months
4. Donor should be of same blood group as the patient.
5. Hemoglobin level must be satisfactory.
6. A donor in normal health can safely give 400-600 ml. of blood at minimal interval of 3 months.

GROUPING OF UNKNOWN BLOOD:

| | Reaction with Group A (Anti-B) serum (containing beta agglutinins) | Reaction with Group B (Anti-A) serum (containing alpha agglutinins) | Blood Group |
|---|---|---|---|
| Cell of an unknown Blood | — | — | O |
| | — | + | A |
| | + | — | B |
| | + | + | AB |

Blood from an Rh negative donor of compatible A, B, or O group is required for transfusion of cases in which immunization to the Rh factor is suspected or proved.

*Volume and rate of flow*—15 ml. per kg. body weight to a child. In adults the amount to be given depends on the extent to which Hb. is to be raised. One pint of whole blood will raise the Hb. by about 8%, and one pint of concentrated red cells by 15%. The drip rate should not exceed 40 drops per minute. When the Hb is below 30%, the anemia has been of long standing, there is presence of chronic sepsis or myocardial damage, initial transfusion should be not more than 100-150 ml. at a drip rate of 10 to 15 drops per minute.

TRANSFUSIONS OF BLOOD FRACTIONS—

1. *Packed red blood cells*—for producing an increase in hemoglobin similar to that of whole blood, but with a much smaller increase in total blood volume. Of value in—preoperative treatment of anemic patients, particularly elderly. To relieve anemia in cases of leukemia, reticulosis or myelomatosis.

## 6. SENSATION

**Conduction of sensory afferent impulses—**

*All forms of sensation*—travel via a peripheral nerve and a sensory root to the spinal cord, or the brain stem.

*Touch*—Fibres carrying sense of light touch ascend the posterior columns on the same side as they enter, upto nuclei gracilis and cuneatus. Further fibres then cross the midline to ascend the brain stem in the medial fillet, being here joined by touch fibres from the face They then pass to the thalamus and on to the post-Rolandic cortex. Other elements of touch on entering the cord ascend several segments, and then cross to the opposite side, enter the lateral spinothalamic tract, ascend this tract and end in the posterolateral ventral nucleus of the thalamus.

*Pain and temperature*—are transmitted only through short posterior root fibres which terminate in posterior horn at the level of root entry and 2 to 4 segments higher. Neurones of the second order cross to the opposite side, enter the lateral spinothalamic tract, ascend this tract and end in the posterolateral ventral nucleus of the thalamus. From the thalamus, sensory impulses pass through the posterior limb of the internal capsule and the thalamo-parietal radiations to the post-Rolandic cortex. However lesions at cortical level cause little disturbance of pain and temperature.

*Deep sensibility* (appreciation of position and movement)—is conveyed centrally by way of long posterior root fibres which ascend in the ipsilateral posterior column These fibres terminate about cell bodies in the gracile and cuneate nuclei, the fibres of which pass across the median plane and ascend in the medial lemniscus to the posterolateral ventral nucleus of the thalamus. A relay from the thalamus extends to the post-central gyrus of the parietal lobe.

Lesions confined to purely cutaneous nerves do not alter deep sensibility because in the peripheral nervous system the fibres subserving deep sensibility pass only in the nerves that supply muscles.

**Localization of lesion**—of disturbances of sensibility.

**Sensory cortex lesions—**

1. Extreme variability of response to sensory stimuli.
2. Impairment of appreciation of posture and passive movement, light touch, and discrimination of two compass points.

female who has been immunized by transfusion not only runs the same risk as the male but also faces the hazard that if she later bears an Rh-positive child, it may be affected by hemolytic disease of the new-born.

9. *Citrate and potassium poisoning*—Large volumes of blood given rapidly carry risks of—(i) Citrate intoxication. This may lead to defective clotting and myocardial failure and it is wise to give 10 ml. of 10% calcium gluconate IV after every fourth bottle of blood (ii) Potassium intoxication may produce cardiac arrest particularly when blood near the limit of its expiry is used. Warming the blood before use will encourage the return of potassium to the cell and the danger can be further reduced by infusion of dextrose solution.

10 *Transfusion hemosiderosis*—In patients receiving repeated blood transfusions over years, iron may be deposited in the liver, causing in some cases, fibrosis and cirrhosis.

11. *Air embolism*—is a minimal danger unless air is forced under pressure into bottled blood in order to allow rapid administration.

12. *Post-transfusion thrombocytopenia*—in middle-aged multiparous women.

## 10. HEMOLYTIC DISEASE OF THE NEWBORN

### (Erythroblastosis Foetalis)

**Mechanism**—Isoimmune hemolytic disease of the newborn results from placental transfer of maternal blood group antibodies of the Rhesus or ABO systems which can destroy the infant's red cells in utero :

1 RH ISOIMMUNE DISEASE—The red blood cells of 85 per cent of human subjects irrespective of their ABO group, contain a further agglutinogen 'Rh' (so-called because of its presence in the blood of the rhesus monkey), i.e a substance which reacts with its corresponding agglutinin present in the plasma of an incompatible blood. If the father's blood contains the Rh agglutinogen (Rh positive) and the mother is Rh negative, the child may be Rh positive Every child however does not inherit the Rh factor from the father; if it does the red cells of the foetus contain the Rh agglutinogen. This may provoke the formation in the mother's plasma of anti-Rh agglutinin, a process known as isoimmunisation. In order for the Rh negative mother to form the agglutinin, it is necessary that some of the red cells of the

4. Qualitative recognition of pain, heat and cold preserved but in dealing with thermal stimuli, e.g., heat, it may be difficult to say which of the two is hotter.
5. Difficulty in appreciating intensity of stimuli.

**Subcortical lesions—**

1. Hemianaesthesia affecting the contralateral face, upper and lower limbs.
2. Sensory loss severe and extensive.
3. No variability of response and threshold as in cortical lesions.
4. No alteration in appreciation of qualitative pain, heat and cold.
5. Astereognosis and loss of appreciation of position, passive movement, and tactile localisation.

**Thalamic lesions—**

1. Gross impairment of all forms of sensation on opposite side of body if lesion extensive.
2. Loss of appreciation of posture, passive movement, and often of light touch.
3. Threshold for pain raised with exaggerated response to painful stimuli (hyperpathia).

**Brain stem lesions—**

1. *Lateral*—Hemianalgesia and thermoanaesthesia on opposite side of body. Intact postural sense, appreciation of passive movement and tactile discrimination.
2. *Lesions of medulla*—affecting the descending root of Vth nerve, and ascending spinothalamic tract from the rest of the body, e.g., posterior inferior cerebellar artery thrombosis—Loss of pain and temperature on one side of face and opposite side of body.
3. *Benedict's syndrome*—Paralysis of third nerve on one side with hemianaesthesia and tremors on opposite side.
4. *Gross lesion*—Bilateral loss of all forms of sensation below a definite level. Upper level of lesion may be indicated by zone of hyperaesthesia. If pain and temperature only affected, only anterior part of cord involved.

**Spinal cord lesions—**

1. *Total cord lesion*—Bilateral loss of all forms of sensation below a definite level. The upper level of the lesion may be indicated by a zone of hyperaesthesia.

**Investigations:**

1. Anemia, normoblastemia and reticulocytosis
2. Cord blood—(a) Hb. values reduced, may be as low as 3-5g/100 ml in hydrops foetalis. (b) Bilirubin—values above 4 mg/100 ml suggest severe disease.
3. Direct Coomb's test—Positive May be negative with ABO incompatibility.

PRACTICAL APPLICATIONS—(i) *Repeated transfusion*—Give only Rh negative blood to all potentially fertile women of child bearing age who are ungrouped or known to be Rh negative. (ii) *Transfusion in pregnancy*—Use Rh negative donors of the same group as the patient or of group O (preferably Rh negative). The husband's blood should not be used.

PREVENTION—Anti-D gammaglobulin 100 mcg. daily to non-immunised Rh-negative women immediately after delivery of an Rh-positive child, the infant's blood group having been determined on a cord blood sample at delivery.

**Treatment:**

(a) INTRAUTERINE FOETAL TRANSFUSION—Hemolysis of foetal blood is accompanied by production of bilirubin which passes into the amniotic fluid which can be obtained for examination by paracentesis. Increased levels of bile pigment in the fluid, or high level with no evidence of fall on subsequent investigation indicates severe hemolytic disease. It is not safe to induce labour before 34-36 weeks, and if treatment is required as indicated by amniocentesis, intrauterine transfusion should be attempted. This is carried out between 24 and 36 weeks and is repeated every 10-20 days until the foetus is considered to be viable

(b) EXCHANGE TRANSFUSION—At birth cord blood should be taken for estimation of Hb and bilirubin levels. The principle is based on two premises—(i) Rh antibody would attack only Rh positive cells, and (ii) as the antibody is derived from the mother, its titre would progressively diminish after birth and would eventually disappear The exchange, of Rh negative blood would, therefore tide the baby over until such time as the maternally-derived Rh antibody disappeared. Rh negative blood should be given to the infant although it is Rh positive, because the infant may have some of the anti-Rh bodies in its circulation or attached to the reticuloendothelial system, ready to react with the Rh positive blood. The principle of exchange transfusion is based on the alternate injection and withdrawal of blood from the infant

between the area of complete sensory loss and that where all sensation is normal. Areas of spurious sensory loss may be found elsewhere, e.g., over one-half of the skull. Reflexes are not diminished.

## 7. THE REFLEXES

### Deep reflexes

CAUSES OF ABSENT DEEP REFLEXES—e.g., knee jerk.

A. *Focal lesions within reflex arc* (Fig. 6.5)—

1. Muscles—Myopathies, periodic paralysis.
2. Myo-neural junction—Myasthenic syndrome accompanying bronchogenic carcinoma. (Usually brisk or present in true myasthenia).
3. Sensory nerves—Sensory polyneuritis, e.g., diabetes.
4. Posterior root ganglion—Herpes zoster of 3rd or 4th lumbar segment.

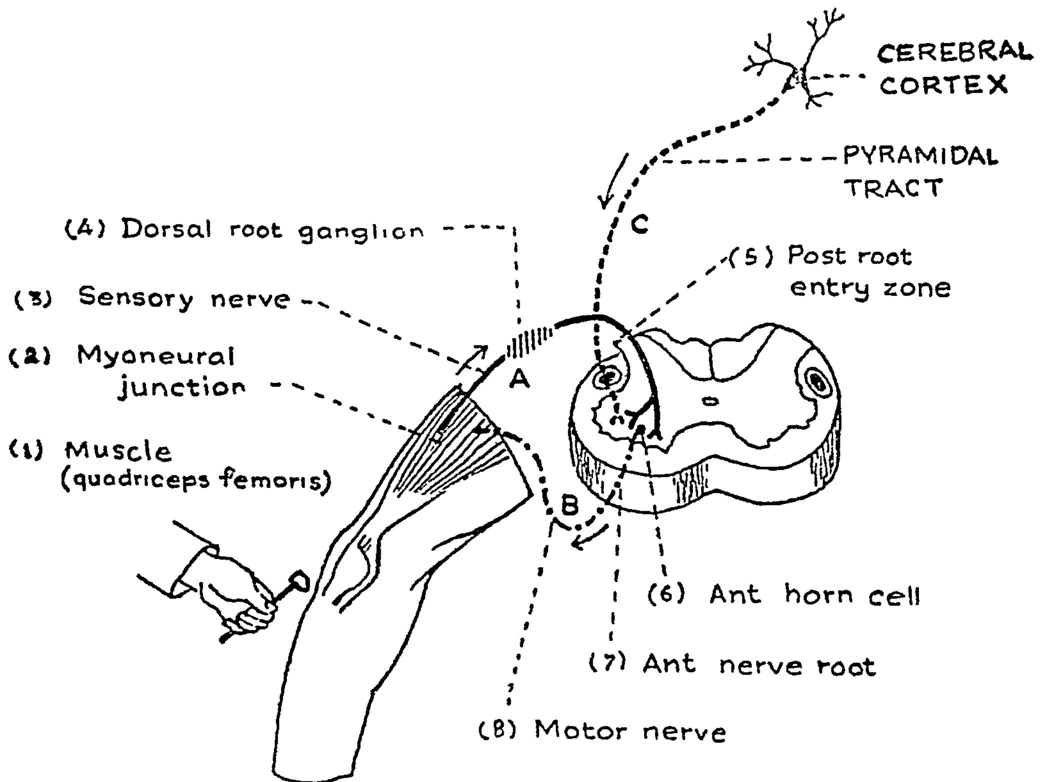



Fig 6.5 Components of the spinal reflex mechanism of the quadriceps reflex (knee jerk). A—afferent path; B—efferent path, C—pathway of cerebral inhibition.

(b) *Viral*—Infective hepatitis, infectious mononucleosis.
(c) *Protozoal*—Malaria, kala-azar, trypanosomiasis.
(d) *Rickettsial*—Typhus.
(e) *Fungal*—Histoplasmosis.
(f) *Parasitic*—Hydatid, bilharziasis.

2 **Circulatory—**

(a) Congestive cardiac failure
(b) Portal hypertension—(i) Suprahepatic—Blocked hepatic veins (Budd-Chiari syndrome). High pressure in inferior cava—tricuspid valve disease, cardiac constriction. (ii) Intrahepatic—Obstruction to portal and hepatic veins in liver Cirrhosis, congenital hepatic fibrosis, schistosomiasis, sarcoid. (iii) Extrahepatic—Obstruction to portal vein outside liver. (iv) Increased blood flow—A-V aneurysm of splenic vessels.

3 **Hematological—**

(a) *Hemolytic disorders*—Hereditary spherocytosis, elliptocytosis, warm-antibody AHA, pyruvic kinase deficiency, thalassemia, hemoglobinopathies (some), paroxysmal nocturnal hemoglobinuria
(b) *Hematologic malignancy*—Acute leukemia, chronic myeloid leukemia, chronic lymphatic leukemia and lymphomas.
(c) *Myeloproliferative disorders*—Polycythemia vera, primary myeloid metaplasia

4 **Inflammatory and collagen disorders—**

Acute rheumatic fever, Felty's syndrome, systemic lupus erythematosus.

5 **Granulomatous disorders—**

Sarcoidosis, berylliosis.

6 **Storage diseases—**

Gaucher's disease, Niemann-Pick disease, histiocytosis X.

7. **Splenomegaly of unknown etiology—**

Tropical splenomegaly, non-tropical splenomegaly

8 **Miscellaneous—**

Iron deficiency, pernicious anemia, amyloidosis, myeloma, mastocytosis, cysts, primary and secondary tumors.

**Clinico-pathological features of Splenic disease:**

I. LOCAL EFFECTS—due to moderate to massive enlargement such as abdominal discomfort, dyspepsia, and symptoms due to pressure on bladder or colon.

**Types of bladder disturbances (Neurogenic bladder)—**

I. UPPER MOTOR NEURONE LESION (Spastic neurogenic bladder). Bladder capacity is reduced and there are involuntary detrusor contractions. Infantile type of reaction with urgency:

1. *Cerebral lesions*—e.g., cerebrovascular accidents, cerebral atheroma, frontal lobe tumors, parasagittal meningioma. Patient voids in inappropriate places (frontal lobe incontinence, uninhibited bladder). Associated mental deficiency. Usually patient is not aware of having soiled his clothes. Infection is common.

2. *Spinal cord lesion* (Spinal bladder):

   (a) *Transection of spinal cord*—of whatever etiology causes flaccid paralysis of bladder (denervated bladder) as it does of leg muscles. Bladder rapidly becomes distended and there is retention with overflow incontinence. Later as spasticity develops (as also spasticity in the legs), the bladder becomes spastic and contracted. Distension produced by accumulated urine provokes reflex contraction (*automatic* or *reflex bladder*). The bladder can be emptied by manual pressure.

   (b) *Incomplete lesion of cord*—e.g. compression, multiple sclerosis, trauma. Weak voluntary control remains Urgency and precipitancy of micturition and difficulty in both initiating and inhibiting bladder action. Sensation of bladder filling and distension may or may not be present depending on whether or not sensory tracts are interrupted.

II. LOWER MOTOR NEURONE LESIONS (Atonic or autonomous neurogenic bladder)—Large bladder. No involuntary detrusor contractions. Lesion in micturition centre of cord, cauda equina, sacral roots, or interrupting sacral reflex arc. Continuous dribbling incontinence. Micturition can be initiated by suprapubic pressure. High infection risk.

1. Posterior root lesions (Sensory bladder)—e.g, tabes dorsalis, subacute combined degeneration, diabetes. Break of reflex arc on afferent side. Bladder both insensitive and hypotonic, and overfills without patient being aware of it. Urine can be voided by considerable straining but evacuation is incomplete.

2. Anterior root lesions—(a) Herniated disc or (b) sacral cord lesions—e.g., spina bifida, tumor. Break of reflex arc

7. *Pruritus*—polycythemia (especially after a bath).
8. *Hemorrhages*—with extreme weakness in leukemia.
9. *Pallor*—in leukemia, hemolytic diseases.
10. *Bone pain*—in Gaucher's disease.
11. *Hematemesis*—may suggest cirrhosis.

**Physical Examination—**

1. *Degree of splenomegaly*—
   (a) *Large to huge*—Chronic myeloid leukemia, malaria, kala-azar, bilharziasis, myelofibrosis.
   (b) *Moderate*—All above plus Hodgkin's disease, leukemias, polycythemia, portal hypertension, chronic hemolytic anemia, tuberculosis, storage diseases.
   (c) *Slight*—All above causes, acute and subacute infections. plus other causes of splenomegaly.
2. *Generalised lymphadenopathy*—chronic lymphatic leukemia, Hodgkin's disease, infectious mononucleosis, sarcoidosis, lymphosarcomatosis.
3. *Palpable liver*—malaria, kala-azar, leukemia, infective hepatitis, portal hypertension, subacute bacterial endocarditis, tuberculosis, sarcoidosis, Hodgkin's disease, syphilis, severe hemolytic anemias, congestive splenomegaly, reticulosis, myeloid metaplasia, amyloidosis, lipoid storage diseases, bilharziasis.
4. *Pallor and icterus*—hemolytic anemias, cirrhosis of liver.
5. *Petechiae and ecchymoses*—acute leukemia, terminal stage of chronic leukemia, leucosarcoma with bone marrow metastasis, subacute bacterial endocarditis.
6. *Plethoric appearance*—polycythemia vera.
7. Pigmentation—Grey-brown pigmentation best seen on medial and flexor aspects of the arms in hemochromatosis.
8 *Arterial spiders and palmar erythema*—in cirrhosis
9. *Tremors*—in Wilson's disease and neurological complication of cirrhosis.
10. *Pinguecula*—in Gaucher's disease.
11. *Kayser-Fleischer ring*—at the periphery of the cornea in Wilson's disease.
12. *Bone changes*—Gaucher's disease, myelofibrosis, multiple myeloma, amyloidosis, metastatic carcinoma
13. *Isolated splenomegaly*—malaria, nonspecific hyperplasia, primary splenic neoplasms, Gaucher's disease, sarcoid.

3. OPISTHOTONUS—Extreme hyperextension of neck and spine varying from arching of spine to a state of rigidity so marked that only heels and vertex touch the bed.

   *Causes*—(i) Meningeal irritation, usually in small children, (ii) extreme extrapyramidal rigidity, e.g., late stages of subacute encephalitis, (iii) tetanus, (iv) pontine hemorrhage secondary to tentorial pressure coning, (v) brain stem encephalitis, (vi) hysteria.

B. **Choreas and Dystonias:**

1. CHOREIFORM MOVEMENTS—Sudden, irregular, brief, varied, pseudo purposive movements.

   *Causes*—(i) Rheumatic fever, (ii) Post-encephalitic, (iii) Huntington's chorea. (iv) Senile or arteriosclerotic chorea and pregnancy. (v) Drug-induced chorea—Neuroleptics, phenytoin. (vi) Miscellaneous—Thyrotoxicosis, systemic lupus erythematosus, polycythemia rubra vera.

2. ATHETOSIS—(Mobile spasm)—Very slow, irregular, twisting movements, one movement perpetually blending with another. Most marked in fingers and wrist. In a typical case the hand movements consist of slow flexion, then hyperextension and spreading out of the fingers irregularly, one after another. Combined with this there is alternate abduction and apposition of the wrist and pronation or supination of the forearm.

   *Causes*—(i) Congenital—atrophic sclerosis of corpus striatum or infantile hemiplegia (ii) Encephalitis. (iii) Cerebral vascular lesions complicating acute fevers. (iv) Cerebral softening due to atheroma.

3. DYSTONIA (Torsion spasm)—is a kind of frozen athetosis, dystonic movements are sustained and slow and lead to abnormal postures. They can occur in isolation or in association with other extrapyramidal disorders

4. BALLISM—Wild, rapid, flinging movements usually affecting the proximal joints of one arm, occurring constantly or with short remissions. Absent during sleep. Movement may be confined to one limb (monoballism), one side (hemiballism), or all the limbs.

   *Cause*—Usually vascular lesion of subthalamic nucleus of Luys.

C **Tremors:** Involuntary, purposeless, rhythmic oscillations of one or more limbs, or less frequently the trunk from

the apparent red cell loss in the liver, it provides supportive evidence for value of splenectomy. (d) Similar studies with isotope-labelled platelets can be used in thrombocytopenic states.

4. *Liver biopsy*—Sarcoidosis, collagen disease, Hodgkin's disease, amyloid disease, hemochromatosis, histoplasmosis.
5. *Bone marrow examination*—in aleukemic leukemia, for lymphocytic infiltration in aleukemic lymphocytic leukemia or lymphosarcoma of spleen, hyperplasia of all elements with large number of megakaryocytes in polycythemia, presence of Gaucher cells. Difficulty of bone marrow aspiration in myeloid metaplasia.
6. *Lymph node biopsy*—of value in tuberculosis, Hodgkin's disease, sarcoid, lymphosarcoma or non-specific hyperplasia and histoplasmosis.
7. *Skin tests*—(a) Tuberculin test—for sarcoidosis. (b) Casoni test—to rule out hydatid.
8. *Tests for portal hypertension*—see p. 68.
9. *Serum proteins*—Elevated globulin with reversed albumin: globulin ratio in multiple myeloma, cirrhosis of liver and occasionally lymphosarcomatosis and disseminated lupus.
10. *E.S.R.*—of gross value in differentiating between splenomegaly of benign type, e.g., Gaucher's disease from that of a malignant nature, e.g., lympho-sarcoma.
11. *Spleen puncture*—for obtaining smear of spleen tissue if other methods are negative or questionable—Lymphosarcoma, Hodgkin's disease, etc.
12. *Lymphangiography*—may demonstrate undetected disease in retro-peritoneal region.
13. *Splenectomy*—as a diagnostic measure in the presence of obscure anemia with leucopenia and thrombocytopenia with splenomegaly.

**Differential Diagnosis of Chronic Splenomegaly**

1. Cirrhosis of liver—
   (i) Symptoms and signs of hepatocellular failure—Spider naevi, liver palms, alopecia, gynecomastia and testicular atrophy in males, icterus, foetor hepaticus. Palpable enlarged liver.
   (ii) Evidence of portal hypertension—Ascites, prominent veins on abdomen, hematemesis, piles.
   (iii) Diagnosis by liver biopsy, demonstration of oesophageal varices by barium swallow, laparoscopy and splenic portography.

*Hysterical. tremor*—A fine tremor localized to one limb or generalized, and a coarse irregular shaking intensified by involuntary movements.

D. **Involuntary movements of face and neck:**

1. *Tics*—Rapid, co-ordinated purposive act, originally a conditioned reflex, provoked by some physical or emotional stimulus and perpetuated as a stereotyped, recurrent involuntary movement, e.g., blepharospasm after attacks of conjunctivitis.
   (a) *Facial tics*—often unilateral, are the most common.
   (b) *Chronic multiple tics* (Gilles de la Tourette syndrome)—Multiple persistent, generalised tics and recurrent verbal utterances consisting of expostulation of obscenities and swear words (coprolalia).
2. *Spasmodic torticollis*—Tonic or tonico-clonic movements resulting in deviation of head to same particular direction.
   Causes—Lenticular disease, arthritis of cervical joints, painful tooth, glandular swelling.
3. *Titubation*—A vertical oscillation of the head seen when patient sits up or stands, and disappearing on lying down.
   Causes—Disease of cerebellar connections, most commonly seen in multiple sclerosis, old age.
4. *Hemifacial spasm*—A condition of varied etiology in adults manifesting itself by clonic spasms of facial muscles and platysma on one side of face. Degree of affliction varies from slight and occasional twitching around mouth or eye to a constant severe spasm which screws up the eye and distorts angle of mouth. Spasm is both precipitated and exaggerated by excitement and tension.

E. **Movements limited to muscles:**

1. *Fasciculations*—Visible spontaneous contractions of groups of muscle fibres indicate degeneration of anterior horn cells, or irritation of the anterior root. (Produced by denervation hypersensitivity to existing acetyl choline.)
   Causes—(1) Benign or physiological following exertion. (2) Anterior horn cell diseases—Motor neurone disease, syringomyelia, hereditary spinal muscular atrophies, poliomyelitis, spinal cord tumor or ischemia. (3) Metabolic and endocrine—Uremia, hyperthyroidism, hypopara-

(e) *Tuberculous splenomegaly*—In rare cases tuberculous enlargement of spleen occurs with little involvement of other organs. Blood picture shows anaemia, leucopenia, or thrombocytopenia, either singly or in combination Weakness, lassitude, loss of weight and often pyrexia Bleeding may occur. X-ray of spleen may demonstrate areas of calcification.

(f) *Bilharziasis* (Egyptian splenomegaly)—(i) History of residence in endemic area (ii) Preceding toxic stage with urticaria, fever, diarrhoea (iii) Emaciation. (iv) Hepatomegaly and progressive splenomega'y (v) Dilatation of abdominal veins (vi) Ascites in terminal stages (vii) Ova in stools and positive complement deviation test (viii) Aspiration liver biopsy will show evidence of cirrhosis and causative ova

3. MYELOPROLIFERATIVE DISORDERS—

(a) *Chronic myeloid leukemia*—
- (i) Massive splenomegaly.
- (ii) Hemorrhages.
- (iii) Bone pains and tenderness of sternum.
- (iv) Weight loss and sweating.
- (v) Symptoms due to infiltration of extramedullary tissues.
- (vi) Peripheral blood film shows granulocytes at all stages of maturation.

(b) *Polycythemia rubra vera*—
- (i) Symptoms due to increased blood viscosity—Headache, fullness in head, shortness of breath, peripheral vessel thrombosis, pruritus, bone pains.
- (ii) Symptoms due to hemorrhages—Epistaxis, gastrointestinal hemorrhage, peripheral vascular bleeding.
- (iii) Splenomegaly usually not pronounced.
- (iv) Raised hematocrit. Bone marrow—hyperplasia of all marrow elements.

(c) *Myelofibrosis*—
- (i) May be primary, or secondary to toxins, malignant infiltration of marrow, chronic infection, irradiation, renal osteodystrophy, marble bone disease, fluorosis, metastases (e.g., carcinoma breast, prostate), Hodgkin's disease, secondary to other chronic myeloproliferative disorders, tuberculosis or syphilis
- (ii) Age—40 to 70.
- (iii) Splenomegaly may be massive, pain due to splenic infarct.
- (iv) Hepatomegaly.
- (v) Gout.

## 9. GAITS

### Diagnostic importance in neurology

**Unilateral defect—**

1. *Hemiplegic (circumducting) gait*—Active forward projection of paralysed limb difficult; front of foot, especially the ball of the great toe rubbing against the ground.
2. *Unilateral high-stepping gait*—of flaccid type in paralysis of external popliteal nerve. Hip and knee lifted too high in order to clear the drop foot from the ground, and brought loosely down.
3. *Limping gait*—in sciatica. Patient limps with short steps, keeping the painful limb semiflexed and dropping the pelvis towards the painful side.
4. *Hysterical gait*—(i) Forward gait—unilateral dragging gait with scraping of the inner border of the foot, as opposed to the outer border in organic hemiplegia; or the whole foot is dragged along the ground. (ii) Side gait—In hysterical hemiplegia, side gait impaired on both sides. In organic hemiplegia the patient moves sideways towards the paralysed side well, but badly towards the healthy side.

**Bilateral defect—**

1 *Spastic gait*—In spastic paraplegia patient moves swiftly along with abnormally short steps, the front part of the foot clinging to the ground, produced by bilateral circumduction of the legs. In severe cases, tendency to ankle clonus causes a trepidation of the whole body from tremors of the feet.
2. *Scissor gait*—A form of spastic gait with legs crossing alternately in front of each other, producing the cross-legged or "Scissor" gait in congenital cerebral diplegia.
3. *Ataxic gait*—(a) *Cerebellar ataxia*—Gait is of two types—(i) Ataxia of legs (Reeling gait)—The patient tends to reel in several sideways steps towards the side of lesion. (ii) Ataxia of trunk—Patient is grossly unstable and reels in any direction. This is seen in midline posterior fossa lesion including tumors of vermis and foramen magnum abnormalities. (b) *Titubant ataxia*—Ataxia with vertical oscillation of head, trunk and arm in disseminated sclerosis.
4. *Reeling or tottering gait*—in severe vertigo, diplopia or alcoholic intoxication. Unsteadiness especially marked on sudden turning.

(iii) Smooth and pale tongue.
(iv) Associated condition—e.g., bleeding piles, hookworm infection, menorrhagia, etc.
(v) Decreased red cell count, hemoglobin and hematocrit with hypochromia in peripheral smear.

(c) *Megaloblastic anaemia*—
(i) Diarrhoea, loss of appetite and weight.
(ii) Mild jaundice may give the patient a lemon yellow tint.
(iii) Glossitis and angular cheilosis.
(iv) Liver usually not enlarged.
(v) Macrocytosis with MCV usually above 100 femtolitres. Bone marrow—Megaloblastic erythropoiesis.

6. Multiple myeloma—
(i) Middle-aged or elderly.
(ii) Bone pain—commonest symptom involving thoracic and lumbar spine.
(iii) Neurological symptoms—Progressive weakness of lower limbs with bowel or bladder dysfunction.
(iv) Anaemia.
(v) Renal failure.
(vi) Recurrent infection.
(vii) Diagnosis—(a) Plasmocytosis on bone marrow aspiration. (b) Monoclonal globulin spike on serum or urine electrophoresis. (c) Well-defined lytic bone lesions.

7. Collagen diseases—
(a) *Systemic lupus erythematosus*—
(i) Mostly in women.
(ii) Multisystem disease with fever, arthritis, skin and renal involvement.
(iii) Lymphadenopathy.
(iv) Hepatic enlargement.
(v) LE cells in peripheral blood or bone marrow.

(b) *Felty's syndrome*—Chronic splenomegaly, neutropenia, with chronic rheumatoid arthritis in adults Other features which may be observed are weight loss, pigmentation of skin, hepatomegaly, moderate lymph node enlargement and ulceration of the leg.

8. Tropical splenomegaly syndrome (TSS)—(i) Gross splenomegaly in immune adults from areas of endemic malaria. (ii) High serum IgM. (iii) Moderate hepatomegaly. (iv) Hepatic sinusoidal lymphocytosis. (v)

## 10. HEADACHE

**Causes:**

I. **Intracranial and local extracranial—**

1. *Trauma*—contusional or post-traumatic headache.
2. *Intracranial inflammations*—Meningitis, encephalitis, cerebral abscess.
3. *Vascular headaches*—Migraine, hypertension, cerebral or subarachnoid hemorrhage, intracranial aneurysm, vasodilator drugs like nitrites, and histamine, adrenaline. Menopausal. Alcohol hangover or withdrawal, coffee withdrawal. Superficial temporal arteritis, thrombosis of intracranial venous sinus.
4. *Extracranial local causes*—(a) *Soft tissues*—Furunculosis or cellulitis of scalp, myositis of occipito-frontal muscle, vigorous head movements, contusion of skin or subcutaneous tissues of scalp. (b) *Bones and paranasal sinuses*—Diseases of upper cervical vertebrae, middle-ear disease, sinusitis and craniostenosis.
5. *Increased intracranial pressure*—Tumor, gumma, cyst, hydrocephalus, hemorrhage. Raised intracranial venous pressure due to thrombosis of intracranial venous sinus or extracranial causes like intrathoracic neoplasm, large goitre or chronic emphysema.
6. *Decreased intracranial pressure*—Hypotension, after lumbar puncture, dehydration.
7. *Cough headache*—A benign syndrome of severe headache which accompanies coughing.

II. **General or systemic causes—**

1. *Anoxemia*—Anaemia, carbon monoxide or carbon dioxide poisoning.
2. *Toxic*—Fevers, uremia, eclampsia, metallic poisoning, "alcoholic" hangover, post-convulsive, drugs like quinine, tobacco, cocaine, morphia, sulphonamides. Pelvic or gall bladder disease, constipation, intestinal stasis. Nervous exhaustion.
3. *Metabolic factors*—Hypoglycemia, alkalosis or acidosis.
4. *Neuritis and Neuralgias*—of sensory nerves of scalp, e.g. orbital neuralgia, or neuralgia of auriculotemporal, posterior auricular or great occipital nerves, herpes of Gasserian ganglion.

megaly usually marked, moderate to marked hepatomegaly. (iii) Periodic attacks of fever common (iv) Blood—Target or oval cells, many normoblasts. (v) X-ray skull—Thickening of diploe, thinning of inner and outer tables with perpendicular striations between the two layers—"hair standing on end" appearance.

(d) *Still's disease*—Rheumatoid type of arthritis, splenomegaly, fever and anaemia, lymphadenopathy and leucocytosis

**Splenectomy:** Indications in hematological disorders—

A. **Diagnostic:**

Splenomegaly is occasionally an isolated finding and the cause may not be identified despite investigations, e.g., simple cyst or hemangioma, chronic granulomas, plasmocytoma and in some atypical cases of lymphoproliferative disorders. In such cases splenectomy may be justified for diagnostic reasons. The fact that the spleen is of normal size does not exclude possibility of the organ being affected by lymphoma

B **Therapeutic:**

1. *Rupture of the spleen*—With a normal spleen severe trauma is required to cause rupture. The diseased spleen may rupture with trivial trauma, e.g., in infectious mononucleosis, acute and chronic leukemias, myelomatosis, autoimmune hemolytic disease and congestive splenomegaly.
2 *Local effects of splenic enlargement*—such as discomfort due to massive splenomegaly, dyspepsia, recurrent infarction, perisplenitis.
3. *Correlation of cytopenias*—(a) *Absolute indications*—(i) Hereditary spherocytosis and hemolytic variant of hereditary elliptocytosis (ii) Chronic idiopathic thrombocytopenic purpura. Even if platelet count does not return to normal, it may be possible to lower the dose of steroids. (iii) Primary hypersplenism—non-tropical variety for correction of cell deficits and to exclude other diagnoses requiring additional therapy. (b) *Relative indications*—(i) Warm-antibody autoimmune hemolytic disease when IgG or IgA antibodies are attached to the red cells. (ii) To relieve cytopenias resulting from red cell and platelet pooling, hemolysis and platelet destruction in cases with moderate to massive splenomegaly, e.g., chronic lymphatic or myeloid leukemia, Gaucher's disease. (c) *Doubtful outcome but severe* (at times life-threatening) *condition*—Thrombotic thrombocytopenic purpura, pyruvic kinase deficiency, some cases of PNH, and the improvement of the effect of platelet transfusions in aplastic anaemia.

3. *Character*—Pulsating or throbbing in fever, migraine and arterial hypertension. Sense of tightness or external pressure in brain tumor and meningitis. Most intense headache usually in subarachnoid hemorrhage, migraine, fever, meningitis, hypertension and terminal phase of brain tumor. Paroxysmal in neuralgia. Psychogenic headache is often described in over elaborate terms. Pain with intracranial tumor is usually deep, nonthrobbing, aching in character, intermittent and lasts from few minutes to hours.
4. *Site and distribution*—Pain with local distribution suggests organic cause. Psychogenic headache usually diffuse, though first evident in neck and occiput Headaches due to hypertension, cerebral tumor, toxic, infective and reflex headaches also usually diffuse. A unilateral headache in one or other temple may be due to intracranial causes such as inflammation or compression. Sinus headache in front of head at onset. Headache bizarre in quality and varying in location usually of psychogenic origin. Posterior headaches extending into the nuchal region or even the shoulder muscles are almost always due to muscle tension.
5. *Provoking and aggravating causes*—Migraine made worse by assuming horizontal position or by jolting Lying down position may at first make the headache of sinusitis more intense but subsequently it subsides. Sudden change of position or head jolt may aggravate headache of intracranial tumor. Muscle contraction headache usually reduced by movements of head and neck. Psychogenic headache likely to be increased by emotional stress and mental fatigue. Vascular or inflammatory headaches of intracranial origin are accentuated by coughing or other forms of brief straining.
6. *Associated symptoms*—Nausea, anorexia and vomiting most common in migraine, vomiting without nausea in brain tumors. No vomits in headache of sinus or eye disease. Visual disturbances usually precede headache in migraine. When visual defects outlast the headache, likelihood of cerebral vascular accident or brain tumor. Depression or anxiety in psychic headache. Symptoms of nasal obstruction, or discharge, or pharyngeal discharge in sinusitis.
7. *Sleep*—Long periods of insomnia because of headache most likely due to anxiety. Meningeal headaches may produce loss of sleep.
8. *Family history*—Of migraine, hypertension, seizure disorder, mental illness.

3. *Due to pituitary hypersecretion*—
   (a) *Skeletal changes*—Enlargement of hands and feet, spade like hands. Tufting of phalanges on radiological examination. Enlargement of facial bones and prognathism. Spacing apart of teeth. Clavicles thickened. Changes in spine—osteoporosis, kyphosis, lordosis and scoliosis. Compression of nerves with resultant neuropathy.
   (b) *Soft tissues*—Tongue enlarged with difficulty in articulation. Thickening of lips and nose. Skin coarse and greasy Thickening of soft tissues of hands and feet. Hypertrophy of muscular system in initial stages Mammary hyperplasia. Hypertrichosis.
   (c) *Cardio-vascular*—Hypertension, cardiac failure or acromegalic cardiomyopathy.
   (d) *Respiratory*—Deep voice due to enlargement of larynx. Lungs enlarge proportionately with thorax
   (e) *General*—Sluggish speech, impaired memory, depression.
   (f) *Metabolic*—Diabetes mellitus in about 25%.
   (g) *Manifestations of adrenal cortex hyperfunction*—Growth of coarse hair on trunk, abnormal growth of hair on face and extremities.
   (h) *Thyroid disturbances*—Rarely clinical picture of thyrotoxicosis may occur.
4. *Due to destruction of rest of pituitary tissue*—Amenorrhoea in females, decreased libido in males. Premature puberty and enlargement of external genitals in adolescents. Hypothyroidism.

**Diagnosis:**

1. *X-ray skull*—Pituitary fossa enlarged, or double floor may be seen due to greater enlargement of the gland on one side.
2. *GH levels during a GTT*—Failure of growth hormone to fall below 5ng/ml (5 mu/1) during an oral glucose-tolerance test is definite biochemical confirmation.

**Treatment:**

1. *Ablation*—(i) *Irradiation*—(a) External deep X-ray therapy—not so effective. (b) Implantation of radioactive isotope (yttrium-90) into the substance of the pituitary

If a pneumoencephalogram shows non-filling, direct ventriculography should be performed. The latter is also preferable if the pressure is sufficiently elevated to cause choking of the optic disc.

V. RESPONSE TO TREATMENT—Tension headache may be relieved with tranquillizers or infiltration with 10 to 20 ml. 1% procaine solution if localised areas of tenderness can be outlined. Ergot relieves migraine. Sinus puncture or chemotherapy relieve headache of sinusitis.

## Migraine

**Definition**—A paroxysmal disorder of cerebral function commonly associated with visual disturbances, unilateral headache and vomiting.

**Etiology:**

(i) *Age*—The onset may be in childhood with cyclical vomiting; typical migraine appears in adolescence and continues at intervals until the sixth decade, when the attacks may cease apart from occasional teichopsia. (ii) *Sex*—More common in women. (iii) *Hereditary influences*—the transmitted factor being an abnormal response of cranial and other vasculature to certain external or endogenous stimuli. (iv) *Precipitating causes*—Prolonged fasting causing low blood sugar, prolonged exposure to bright light, ingestion of amino acid tyramine. (v) *Conditions associated with migraine*—Tension headache, the periodic syndrome (recurrent bilious attacks of childhood), epilepsy, allergy.

MECHANISM: Familial tendency towards enhanced vascular contractility in migraine patients produces a sequence of constriction and dilatation. Stimuli which normally produce a healthy flush may produce an inco-ordinated circulatory response in migraine patients resulting in constriction of small vessels and dilatation of arteries and veins. Serotonin released from platelets produces vasoconstriction. Serotonin then gets adsorbed into vessel wall and in combination with locally released heparin and neurokinin produces pain. Fall of plasma serotonin results in overaction of dilator substances like histamine, bradykinin and prostaglandin E Serotonin release from platelets is increased by free fatty acids and IgG aggregate.

**Classical migraine:**

1. *Prodromal symptoms*—usually lasting 15-20 minutes precede headache and are related to patial ischemia in territory of certain intracranial arteries. (a) *Visual symptoms*—

**Clinical features:**

1. Wasting with precocious senility.
2. Wrinkled dry skin with typical 'crow's feet' configuration of wrinkles round the mouth and up the cheeks.
3. Skin pallor out of proportion to the moderate anaemia.
4. Loss of pubic and axillary hair and sometimes of teeth.
5. Gonadal atrophy—Amenorrhoea, sterility and loss of libido in female; decreased potency and aspermia in male.
6. Thyroid deficiency—Subnormal temperature, myxoedema facies, low metabolic rate, dry skin, and constipation.
7. Adrenal insufficiency—Low blood pressure, asthenia, and crises of nausea and vomiting which may be associated with spontaneous hypoglycemia Low values of 17-oxo-steroids in urine.

**Investigation:** of hypopituitarism

1. Visual fields.
2. Pituitary radiology—Skull radiographs, pituitary tomograms, air encephalogram, carotid arteriogram, metrizamide cysternography.
3. CT brain scan
4. Pituitary function tests: Basal hormone concentration in plasma of: (a) LH and FSH. (b) T4, T3 binding index, free thyroxine index, TSH. (c) Prolactin. (d) Testosterone or oestradiol. (e) Cortisol or (ACTH). (f) GH.
5. LH/FSH-RH and TRH tests—Measurement of LH and FSH responses to gonadotrophic releasing hormone (LH/FSH-RH) and TSH and prolactin responses to thyrotrophin releasing hormone (TRH) may help to distinguish between pituitary and hypothalamic cause for hypopituitarism.

**Treatment:**

1. *Treatment of underlying cause* if possible, e.g. surgical removal of pituitary adenoma or craniopharyngioma
2. *Substitution therapy*—Replacement of target gland hormones always necessary. *ACTH*—Dexamethasone 0.5 mg daily each morning. Dose must be doubled if intercurrent illness or stress. *TSH*—Thyroxine 0.1 mg daily. *GH*—essential only until fusion of epiphyses. 10 mg twice weekly IM Dose may have to be increased because of development of circulating antibodies to GH. *Gonadal steroids* (LH/FSH)—Male: Testosterone esters 250 mg IM every 14 days to one month, or testosterone implants at 3-6 months intervals. Female: Cyclical oestrogen-progesterone combination
3. *Radiotherapy*—When radical removal is incomplete.

in a migrainous type of headache, accompanied by vertigo and occasionally vomiting.

6. *Ophthalmoplegic migraine*—Headache is commonly around the eye and is accompanied by weakness of movement of one eye (usually III nerve) which may outlast the headache by some days. Children are more commonly affected.
7. *Facial migraine*—Unilateral episodic facial pain associated with symptoms suggestive of either migraine or cluster headache. It can be distinguished from migrainous neuralgia by longer duration of pain, lack of clustering, and more frequent episodes of nausea and vomiting.
8. *Retinal migraine*—Loss of vision limited to one eye.
9. *Complicated migraine*—Patient is left with a persistent neurological deficit after a migraine attack. This occurs most commonly after hemiplegic migraine CT scan has revealed this to be a much more common occurrence than previously believed, and the pathological basis is presumably infarction after ischemia.
10. *Symptomatic migraine*—The term is used when symptoms suggest diagnosis of migraine but where a structural lesion is found such as angiomatous malformation or arterial aneurysm.

MIGRAINE EQUIVALENTS—Prodromal symptoms occur without headache or vomiting, dysarthria, etc.

**Management:**

**A. During attack—**

1. *Analgesics*—like aspirin or paracetamol.
2. *Ergotamine*—most important drug for severe attacks. (a) Ergotamine tartrate 0.25 to 0.5 mg. I.M. or orally 1-2 mg. tablet preferably in combination with 100 mg. caffeine—2 tablets are given at onset followed by 1 tablet every ½ hour to a total of 6 tablets if necessary, or (b) dihydroergotamine 1 mg. I.M., or 1-2 mg. by mouth. Whichever preparation is used, a high dose often causes nausea and vomiting These may be prevented by giving cyclizine 50 mg or chlorpromazine 25 mg. Contraindications to ergotamine—septic or infectious states, peripheral vascular disease, coronary disease, pregnancy, thyrotoxicosis.
3. *General*—Lying in a darkened and quiet room, and ice pack to the head may help.

8. *Primary skeletal disorders—Achondroplasia*—Disproportionate shortening of long bones as compared to normal sized trunk and head.
9. *Chronic diseases*—retard growth and in these cases the history and examination are usually diagnostic. (i) Vitamin D deficiency rickets. (ii) Renal acidosis—may occur in either generalised renal disease or in specific tubular defect. (iii) Coeliac disease—Stunted retarded child with anorexia, distended abdomen, wasted buttocks, anaemia and steatorrhoea. (iv) Diabetes mellitus (unregulated). (v) Glycogen storage disease. (vi) Idiopathic hypercalcemia of infancy. (vii) Congenital heart disease. (viii) Pseudo-hypoparathyroidism—due to unresponsiveness of kidneys and bones to action of parathormone. Dwarfism, epilepsy, mental changes, intracranial calcification in basal ganglia, soft tissue calcification and brachydactyly (ix) Hurler's syndrome (Gargoylism)—Physical and mental retardation, enlargement of skull, kyphosis, gibbus, corneal opacities, thick tongue, short stubby fingers, hepatosplenomegaly, abdominal hernia.
10. *Emotional and physical deprivation*—Growth retardation and hormone dysfunction are reversed if the child is removed to a satisfactory emotional and physical environment.
11. *Unclassified*—Progeria—Alopecia, bird like features, premature senility.

## Adiposogenital dystrophy (Frohlich's syndrome)

*Cause*—of true Frohlich's syndrome is hypothalamic lesion, commonest being craniopharyngioma.

*Clinical features*—

1. Adiposity of buffalo type.
2. Headache, vomiting and visual disturbances if tumor
3. Sexual infantilism pronounced in males; genital deficiency in girls not evident until puberty.
4. Hands small and fat with tapering fingers, delicate hairless skin.
5. Other symptoms of hypothalamic disturbance may be present—lethargy, polyuria, polydipsia, and sleep disorders.

*X-ray skull*—Deformity, erosion or compression of sella turcica and anterior clinoid process if tumour.

2 mg t d.s. Stop for one day when the bout reaches its end. Restart if headache recurs. (v) Prednisolone 30 mg single dose. (vi) Lithium carbonate 600 mg daily in divided doses for 7 days.

## 11. EPILEPSY

**Definition**—Epilepsy is defined as a condition characterised by recurrent episodes primarily of cerebral origin, in which there is a disturbance of movement, sensation, behaviour or consciousness. These episodes begin suddenly and have a tendency to disappear spontaneously.

**Causes:**

I. **Idiopathic**—

Due to inherited constitutional tendency to seizures.

II. **Symptomatic**—

(a) INTRACRANIAL CAUSES—

1. *Increased intracranial pressure*—Tumor, hydrocephalus, subarachnoid hemorrhage.
2. *Infections*—Meningitis, encephalitis, neurosyphilis, cerebral cysticercosis.
3. *Trauma*—Intracranial hemorrhage, head injuries.
4. *Cerebrovascular disease*—Cerebral atheroma, hemorrhage, thrombosis, embolism, hypertensive encephalopathy, Stokes-Adams syndrome.
5. *Congenital abnormalities*—Cerebral diplegia, porencephaly, tuberous sclerosis.
6. *Degenerations*—Cerebromacular degeneration, diffuse sclerosis, lipidosis.
7. *Anoxia*.

(b) EXTRACRANIAL CAUSES—

1. *Toxins*—(a) Exogenous—Alcohol, cocaine, lead, arsenic, cardiazol, nikethamide, camphor. (b) Endogenous—Eclampsia, uremia, cholemia, hypoglycemia, hypocalcemia.
2. *Anoxemia*—Asphyxia, carbon monoxide poisoning.
3. *Metabolic disorders*—Alkalosis, phenylketonuria, Lesch-Nyhan syndrome.
4. *Endocrine disorders*—Tetany.
5. *Conditions of childhood*—Teething, rickets, pyridoxine deficiency, etc.

**Diagnosis :**

1. *Water deprivation test*—based on failure to elaborate a concentrated urine in response to water deprivation No fluids for 8 hours. Urine is then passed hourly and volume and osmolality recorded. Plasma is collected for osmolality at the beginning and the end of the test. *Interpretation*—At the end of the test the normal plasma osmolality should be less than 300 mOs/kg and the urine osmolality concentrated to greater than 600 mOs/kg.

   *Response to vasopressin*—At the end of 8 hours patient may drink Give desmopressin 20 mcg intranasally or pitressin tannate in oil 10 units well warmed and shaken IM. Urine collected for 4 hours. Interpretation—In CDI urine that remains hypotonic after fluid deprivation is concentrated following vasopressin Hypotonic fluid following exogenous vasopressin strongly suggests NDI.
2. *X-ray skull*—for any sellar or extrasellar pathology.

**Differential Diagnosis**— (OF POLYURIA AND POLYDIPSIA)

1. *Diabetes mellitus*—Urine volume rarely exceeds 3 litres per day. Presence of sugar in urine and elevated blood sugar.
2. *Chronic renal failure*—Urine not in such large quantities, often nocturia. Blood pressure high. Other urinary findings like albuminuria and casts. Polyuria resistant to pitressin. Specific gravity fixed at about 1,010 in chronic renal failure.
3. *Primary polydipsia*—(Compulsive water drinking)—usually in women. Evidence of psychological disturbance. Whereas in diabetes insipidus the intake of fluids is relatively constant from day to day and through the night also, in compulsive water drinking it fluctuates widely and irregularly, and may cease during the night. Relative dominance of thirst rather than polyuria Unlike diabetes insipidus the plasma osmolality at start of water deprivation test as well as at the end is low.
4. *Hypercalcemia*—High serum calcium. Inability to concentrate urine.
5. *Hypopotassemia*—Polyuria may be seen in the presence of decreased values for serum potassium Symptoms of drowsiness, anorexia, nausea and marked muscular ·weakness. Electrocardiogram—prolongation of QT interval. T wave inversion and sagging of ST segment Correction of electrolyte disturbance results in return to normal.

II **Secondary generalised seizures:**

(a) AKINETIC AND MYOCLONIC SEIZURES—Jerking of a limb or limbs (mostly upper limbs) associated with attacks of loss of postural tone (akinetic seizures), or major seizures. May occur with petit mal but more common in diffuse brain damage e.g. lipidoses. Familial myoclonic epilepsy is associated with dementia, extrapyramidal and cerebellar affection.

(b) PETIT MAL VARIANT—Recurrent myoclonic jerks and drop attacks occur in children who often are mentally retarded. EEG shows spike and wave rhythm of 2-2½ c/sec, differentiating from true petit mal.

(c) HYPSARRHYTHMIA—An EEG diagnosis based on high voltage, continuous, bilateral spikes and wave activity. Seen in children between 4 months to 4 years who present with salaam attacks. Encountered in children with brain damage, tuberous sclerosis and phenylketonuria. Respond to ACTH therapy.

III. **Partial seizures:**

Seizures which start by activation of a group of neurones limited to a part of a single hemisphere.

(1) SIMPLE PARTIAL SEIZURE (Jacksonian seizure, Focal epilepsy)—suggest a localised lesion of the brain. The pattern of the seizure depends on the area of the brain irritated by the organic lesion. Generalised convulsions may or may not follow (i) *Motor*—starting in pre-Rolandic area. Intermittent rhythmical jerking of hand and arm, this may spread to face or leg. (ii) *Sensory*—from postrolandic or parietal area, with paraesthesia as the primary manifestation (iii) *Occipital lobe*—Negative: e.g. impairment of vision in part or whole of visual field, or positive e.g. unformed visual hallucinations such as flashes of light. (iv) *Frontal lobe seizures*—Loss of consciousness without focal onset. May be mistaken for idiopathic epilepsy. (v) *Epilepsia partialis contnuans*—Continuous focal motor seizure involving part of a body which may continue for hours or days. Organic lesion is usually responsible.

(2) COMPLEX PARTIAL SEIZURE with impairment of consciousness—(a) Simple partial onset followed by impairment of consciousness or (b) impairment of consciousness at onset.

for these patients who must also retain normal renal and adrenal function and must not be hypotensive or hypovolemic.

(a) Tumors—Carcinoma of bronchus, also of duodenum, pancreas or prostate. Lymphoma, leukemia, thymoma. (b) Drugs—Vasopressin preparations, oxytocin, chlorpropamide, clofibrate, carbamazepine, thiazide diuretics, phenothiazines, tricyclic antidepressants, cyclophosphamide, vincristine. (c) Miscellaneous—(i) Trauma. (ii) Pulmonary—pneumonia, tuberculosis. (iii) Neurological—meningitis, encephalitis, brain abscess, subarachnoid hemorrhage, peripheral neuropathy. (iv) Endocrine—Hypothyroidism, (v) Idiopathic.

*Symptoms*—Mainly due to cerebral dysfunction—confusion, irritability and abnormal behaviour occur early followed by drowsiness, ataxia and difficulty in swallowing. Occasionally fits and coma.

Treatment.—1. Restriction of fluids to 0.5-1.0 litre/24 hours. 2. Demeclocycline—If water restriction is poorly tolerated—upto 1 2 g/24 hours in divided doses. 3. Saline infusion—5% saline at 0.06 ml/kg/hour in severe symptomatic hyponatremia for rapid though shortlived improvement.

## 2. OBESITY

**Causes:**

1 **Simple obesity—**

(a) *Alimentary* (Exogenous): (i) Overeating—Habit, food addiction, psychiatric illnesses, peptic ulcer, hypoglycemic syndromes, beginning from convalescence after acute illness. (ii) Lack of exercise.

(b) *Constitutional* (Endogenous)—Hereditary predisposition or idiopathic or genetic obesity.

2 **Obesity accompanying other disorders—**

(a) *Pituitary*—(i) Frohlich's syndrome. (ii) Puberty adiposity. (iii) Climacteric both males and females. (iv) Pregnancy.

(b) *Thyroid*—Hypothyroidism.

(c) *Adrenal cortex*—Cushing's syndrome.

(d) *Gonads*—Eunuchoidism sometimes. Polycystic ovaries.

(e) *Pancreas*—Islet-cell tumours and chronic hypoglycemia often associated with adiposity.

(f) *Hypothalamus* — Encephalitis, meningo-encephalitis, craniopharyngioma (including Frohlich's syndrome).

of seizure. (a) Normal—Series of small alpha waves about 10 per second and occasionally smaller beta waves. (b) During attack an abnormal rhythm develops —(i) Grand mal and Jacksonian epileptic attacks—a series of sharp spikes. (ii) Petit mal—alternating large dome-shaped waves and sharp spikes (dart and dome rhythm). (c) Between the attacks—Abnormal in about 50%. Intermittent irregular slow waves especially in grand mal Normal E.E.G does not rule out epilepsy.

3. *Laboratory studies*—(a) *C.S F.*—normal in majority of patients with seizures of unknown cause. (b) *Blood*—Low blood sugar when hyperinsulinism, low blood-calcium if hypo-parathyroidism, increased non-protein nitrogen if uremia. Serological test for syphilis.
4. *X-ray skull—for evidence of intracranial tumor, etc.*
5. *Computerized tomography* (CT scan)—Structural lesions such as tumors, angiomas, and focal areas of atrophy can be revealed.
6. *Pneumoencephalography and cerebral angiography*—may reveal some abnormality.
7. *X-ray of muscles*—if there is suspicion of cysticercosis.

**Differential Diagnosis:**

1. *Hysterical fit*—

| *Hysterical fit* | *Epileptic fit* |
|---|---|
| Induced by emotional excitement. | Fairly constant periodicity. |
| No incontinence. | Incontinence common. |
| Patient not hurt. | Tongue biting. At times injury from fall. |
| Usually in presence of people. | Can occur anywhere. |
| Movements spectacular. No clonic or tonic sequences. | Tonic and clonic phases. |
| No extensor plantar response. | Extensor plantar response after attack. |
| Corneal reflex present. | Corneal reflexes absent during attack. |
| No turning of head and eyes, eyeballs roll upwards if eyes forcibly opened. | Conjugate deviation of head and eyes. |
| Attacks may be prolonged to impress spectators. | Attacks of short duration. |
| Recovery after attack sudden. | Gradual recovery. |

| *Mixed diet* | *Vegetarian diet* |
|---|---|
| **Evening tea** | |
| Tea with 2 teaspoons milk, sugar one teaspoon<br>2 cream-cracker biscuits | Tea with 2 teaspoons milk, sugar one teaspoon<br>2 cream-cracker biscuits |
| **Dinner** | |
| Chicken soup one cup<br>Lean meat or chicken roast<br>Cooked brinjal<br>Brown custard from remaining allowance of milk and sugar | Tomato soup one cup<br>Skimmed milk curd 1/2 cup<br>Cooked carrots<br>Thin dal 3/4 cup<br>Bread 1 slice or chappatis 2<br>Ice cream from remaining allowance of milk and sugar |
| Daily ration:<br>Milk (skimmed) one cup<br>Sugar 3 teaspoons | Daily ration:<br>Milk (skimmed) 2 cups<br>Sugar 3 teaspoons |

3. DRUGS—*Appetite suppresants*—(i) *Phenylethylamine derivaties*—(a) Amphetamine, D-amphetamine (20 mg) and phenmetrazine (30 mg.) Potential CNS stimulants. Danger of dependance. (b) Phentermine (30 mg), Chlorphentermine and Diethylpropion (75 mg in form of prolonged-release preparation). Contraindicated in patients with cardiovascular disease and hypertension. (ii) *Fenfluramine* (20 mg tablet, 60 mg capsule) does not cause CNS stimulation. Drug dependence may develop but no addiction. Side effects include lethargy, diarrhoea and other gastrointestinal upsets, vivid dreams and reversible alopecia, but the major drawback is depression which is likely to occur if the drug is withdrawn abruptly. (iii) *Mazindol* (Teronac)—Synthetic tricyclic compound 1 mg. with breakfast.
4. PSYCHOTHERAPY—Motivation for weight reduction must be cultivated in the patient's mind. Neurotic subjects are known to seek relief from their anxiety by eating.
5. STARVATION—Fasting as a method of treatment offers advantage of dramatic drop in weight within one week of treatment and this may be of psychological benefit.
6. SURGICAL PROCEDURES—Jejuno-ileal bypass or partial gastrectomy. Indicated in vastly obese patients (twice or more than 45 kg the ideal weight) who have failed to lose weight despite at least 5 years of medical treatment.

| *Drug* | *Avg. daily dose & Indication* | *Toxic effects* | *Remarks* |
|---|---|---|---|
| (3) *Acetylureas:* Phenacemide (Phenurone) | 1.5 g. PS | Rash, anorexia, weakness, hepatitis agranulocytosis, aggravation of personality disturbances | Especially useful for automatism and psychical seizures More toxic than other drugs |
| (4) *Glutarimides:* Amino-glutethimide (Elipten) | 1.0 g. PM | Frequent skin rash. | Less potent than phenobarbital. Usefulness limited by its sedative action. |
| (5) *Oxazolidines:* Trimethadione (Troxidone) | 900 mg. PM | Photophobia, rash, drowsiness, agranulocytosis, hepatitis, nephrosis | Largely superseded by sodium valproate or ethosuximide. |
| Parametha-dione (Paradione) | 900 mg. PM | Same as above but less frequent. | Indications same as for troxidone but less effective May be preferred because of low toxicity. |
| (6) *Succinimide:* Phensuximide (Milontin) | 2 0 g. PM | Dizziness, ataxia, nausea. Nephrotoxic effect known. | Used for petit mal triad, but not as effective as above drugs |
| Methsuximide (Celontin) | 900 mg PM | Same as milontin | Useful for petit mal and psychomotor epilepsy. |
| Ethosuximide (Zarontin) | 1 0 g PM | Nausea, gastric distress, drowsiness, dizziness and headache. | Effective in pure petit mal (psychomotor epilepsy) |
| (7) *Dipropyl acetate:* Sodium valproate | Upto 1 g. GM+PM | Gastro - intestinal upset Loss and curling of hair. | Useful for grand mal and petit mal, myoclonic epilepsy and drug refractory temporal lobe epilepsy. |
| (8) *Carbonic anhydrase inhibitors:* Sulthiame | 200 mg PS | Headache, paraesthesia, drowsiness, psychic reactions, blurring of vision, nausea and vomiting | Can potentiate actions of phenobarb and phenytoin. |

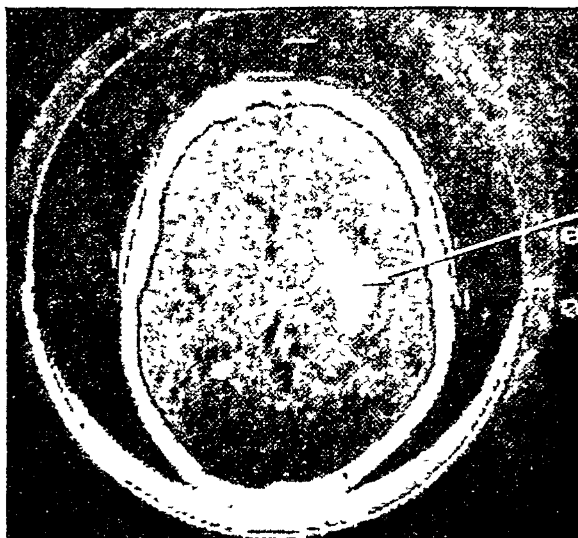
antibodies probably because of failure of either suppressor T lymphocyte function or of anti-idiotype antibody production.

**Clinical features:**

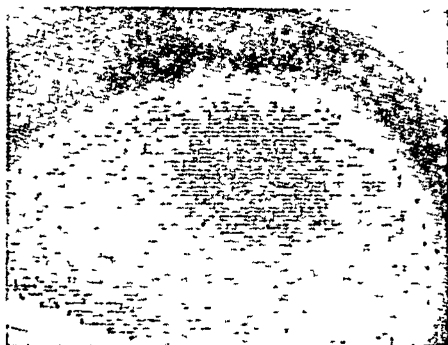
1. *Goitre*—Present in majority although the thyroid enlargement may be difficult to detect. Systolic bruit may be heard over the gland due to increased vascularity.
2. *General*—
   (a) Fear, anxiety, restlessness.
   (b) Tremor—Fine tremors on extending the hands. It may be unknown to the patient.
3. *Cardiovascular*—
   (a) Tachycardia which persists during sleep.
   (b) Large pulse pressure with raised systolic pressure.
   (c) Flushing of face and neck in warm atmosphere due to unstable vasomotor system.
   (d) Capillary pulsations may be seen.
   (e) Cardiac arrhythmia—Ectopic beats, paroxysmal tachycardia or atrial fibrillation.
4. *Eye signs*—
   (a) Exophthalmos (proptosis) or widened eye-slits causing a "stare".
   (b) Chemosis and conjunctival irritation.
   (c) Periorbital oedema.
   (d) Upper lid retraction.
   (e) Ophthalmoplegia.
5. *Metabolism*—
   (a) Loss of weight in spite of increased appetite.
   (b) Liver is depleted of glycogen and transient or persistent glycosuria appears.
   (c) Fat depots tend to disappear.
   (d) Increased ability to stand cold and intolerance of heat.
   (e) Fever not infrequent especially with slight infections.
   (f) Demineralisation and rarefaction of bones not uncommon.
6. *Gastro-intestinal tract*—Uncontrolled diarrhoea, abdominal discomfort after meals, nausea, epigastric pain like peptic ulcer, achlorhydria. Voracious appetite.
7. *Behaviour and emotion*—Irritability. Patient restless and anxious. Inability for sustained concentration, talkative and full of ideas, emotional distress common. Occasionally psychosis.



Occulsion of internal carotid artery (arrow) as demonstrated by angiography



CT scan showing a cerebral hemorrhage (white area) in right basal ganglia region.



Isotope scan showing a well circumscribed area of increased uptake in left hemisphere due to parasagittal meningioma



Carotid arteriogram showing backward bowing of the anterior cerebral artery which has been displaced by the tumor

TBP). Measurement of TBP, the unoccupied binding sites is the basis of T3 uptake tests.

2. T3 UPTAKE TEST—Radioactive T3 (T3*) and a resin are added to patient's serum. Competition for the T3* ensues between the resin and the unoccupied thyroid hormone binding site in patient's serum proteins. T3 remaining on the resin after washing reflects concentration of these unoccupied sites.

$$\text{Free T4 index} = \text{Serum T4} \times \frac{\text{T3 resin uptake of patient}}{\text{T3 resin uptake of control}}$$

3. SERUM TBG—TBG concentration can be measured directly by radioimmunoassay or immunoelectrophoresis. Determination of T4/TBG ratio permits simple expression of serum T4 in terms of available binding protein.

4. SERUM T3 CONCENTRATION—Normal range 1-3 nmol/1 or 0.7–2.0 $\mu$g/1. High concentration almost always found in hyperthyroidism. In the syndrome of T3-toxicosis high serum T3 values are found in association with normal serum T4.

5. TRH TEST—IV injection of TRH (200 $\mu$g) is followed in normal subjects by rise in serum TSH concentration which reaches a peak within 15-20 minutes and declines to normal within 1-2 hours. Little or no response is seen in hyperthyroidism A positive response thus rules out hyperthyroidism.

To summarise: (1) First step should be assay of serum T4 concentration, almost always with a T3 uptake test. This allows determination of free T4 index which if raised provides the answer in almost all cases. (2) If these tests are normal, patient may be suffering from T3 toxicosis which can be checked by assay of serum T3 concentration, or (3) A TRH test may be carried out to exclude hyperthyroidism by demonstrating a TSH response.

6. RADIOACTIVE ISOTOPE TESTS—are now seldom used as part of routine thyroid testing because they lack diagnostic discrimination. In hyperthyroidism thyroid uptake of radioactive iodine is generally *increased* There are some forms of this disease in which thyroid uptake is diminished or absent: (a) A form of thyroiditis in which transient phase of hyperthyroidism may be present (b) Syndrome of iodine-induced hyperthyroidism. (c) A similar condition of hyperthyroidism may be seen after excessive ingestion of thyroid hormones (thyrotoxicosis factitia) or (d) resulting from hydatidiform mole In these uncommon types, thyroid uptake tests may be of help

4. SOCIAL AND PSYCHOLOGICAL MANAGEMENT—Attention to doubts and fears of the patient. No imposition of unnecessary restrictions. Education of the patient and his relatives about the nature of the illness, its precipitating factors and its consequences.

**Management of status epilepticus** (continuous seizures):

1. *Adequate respiratory exchange*—Institute oral suction and provide an airway by supporting the jaws in an extended position or by inserting an oral airway. Position the patient so as to minimise the danger of aspiration.
2. *Blood pressure*—to be closely watched.
3. *Take blood*—for complete blood count and electrolytes, and give IV fluids.
4. *Examine patient for any infection.*
5. *Protect from external injuries*—by providing padding about the joints.
6. *Drugs*—(a) *Diazepam*—10 mg. injected directly into saline or dextrose infusion over 2 minutes Repeat after 10 minutes if seizures persist or return, followed by IV infusion containing 200 mg./litre. The flow rate should be adjusted to control the seizures. (b) *Phenobarbital*—200 mg. IM, or IV diluted in 50 ml. normal saline over a period of 10 minutes if seizures have not terminated Respiratory depression and serious hypotension may occur in patients receiving diazepam and phenobarb combination. (c) *Diphenylhydantoin*—1 g. IV in one litre dextrose infusion at rate of 25-50 mg/min. Discontinued if seizures stop or total dose of 1000 mg. has been given, or respiratory depression or hypotension. Contraindicated in older patients, and in presence of cardiac arrhythmia or severe cardiac disease. (d) *Thiopentone sodium*—infusion 1 g/litre may be tried if diazepam fails. Risk of respiratory depression.
7. *General anaesthesia*—when all other measures fail.
8. *Subsequent treatment*—Once there is a break in the fits, an intragastric tube should be passed and usual anticonvulsants given by this route. A suitable combination is 2 teaspoons of dilantin suspension (0 2 gm.), and mysoline (0.25 gm.) with phenobarbitone (60 mg.) to be administered alternately every 4 hours.

**Management:**

**1. "Antithyroid" compounds—**

*Indications*—(i) All subjects preoperatively. (ii) Children and adolescents with first attack of thyrotoxicosis. (iii) Thyrocardiacs and thyrocachectics. (iv) Patients with small toxic multinodular goitres. (v) Pregnancy with hyperthyroidism. (vi) Patients who for some reason cannot have surgery, and radioactive iodine is not available or justified because of young age of the patient. (vii) Mild cases. (viii) In conjunction with radioiodine when severity of hyperthyroidism makes this imperative.

*Contraindications*—(i) Hypersensitivity. (ii) Anaemia or leucopenia. (iii) Kidney or liver disease.

*Mode of action*—Blocks formation of thyroxine by an action which diminishes the amount of free iodine available for the purpose of uniting with tyrosine to form thyroxine.

*Toxic effects*—Common are itching, erythema, urticaria, lymphadenopathy and fleeting joint pains. Rarely agranulocytosis

*Dosage*—Initial daily dose: Carbimazole 40 mg, methimazole 40 mg or propylthiouracil 400 mg in divided doses for 4-6 weeks depending on the response. The dose is then halved and thereafter brought down to the least amount which will control the disease, usually 5 mg. b.d. given for 18-24 months.

*Disadvantage*—High incidence of recurrence and necessity for continuing treatment for prolonged periods.

**2 Subtotal thyroidectomy—**

*Indications*—(i) When patient favours a rapid attack on the disease. (ii) Sensitivity reactions to antithyroid compounds. (iii) Severe thyrotoxicosis not responding to medical treatment. (iv) Irregular or frankly nodular or unduly large goitre, or signs of retrosternal extension or respiratory obstruction. (v) Tracheal compression.

*Contraindication*—Surgery is contraindicated in patients showing evidence of marked exophthalmos. The likelihood of such patients developing even more severe exophthalmos of the malignant type after surgery is great.

*Advantages*—(i) Cures a higher percentage of patients. (ii) Cures in a shorter time.

ANTERIOR CEREBRAL ARTERY—Occlusion distal to origin of Heubner's artery may result in contralateral paralysis with main brunt on the leg, cortical type of sensory loss and incontinence. (a) Occlusion proximal to anterior communicating artery may be asymptomatic. (b) If Heubner's artery is involved there is spastic involvement of the arm which is maximally affected proximally.

POSTERIOR CEREBRAL ARTERY—Usually contralateral homonymous hemianopia only.

INTERNAL CAROTID ARTERY—(i) *Acute hemiplegia*—Similar to middle cerebral artery which arises from it. The only sign which differentiates the two is the ipsilateral mono ocular blindness (contralateral to the hemiplegia) in internal carotid artery lesions. (ii) *Stuttering hemiplegia*—Hemiplegia lasting several hours and recovering with few or no abnormal physical signs. Hemiplegia recurs after a few hours but again recovers with increase in residual signs. The process is repeated until the patient has a dense hemiplegia which persists. (iii) *Progressive dementia.*

VERTEBROBASILAR ARTERY—'Brain stem' signs such as diplopia, vertigo, drop attacks, facial paraesthesiae, dysarthria, ataxia and bilateral or alternate involvement of motor and sensory function in the limbs.

OTHER CLINICAL SYNDROMES:

*Watershed infarction*—During transient circulatory arrest or profound anoxia, infarction can occur between arterial territories, particularly in parieto-occipital region which is the watershed between middle, anterior and posterior cerebral arteries Usual picture is of visual disorientation or cortical blindness, often associated with visual field defect and sensory impairment

*Multi-infarct dementia*—A succession of minor vascular events can lead to dementia

PATHOGENESIS · *of cerebrovascular disease*:

(i) *Spontaneous intracranial hemorrhage*—(a) Berry aneurysm, (b) arteriovenous malformation (bleeding usually into subarachnoid space), or (c) hypertensive vascular disease. (d) Other causes—thrombocytopenia, coagulation disorders and use of anticoagulants; inflammatory arterial disease, mycotic aneurysms in SBE

(ii) *Cerebral thrombosis*—(i) Arterial disease—(a) Atherothromboembolism. (b) Arteritis—SLE, polyarteritis nodosa, giant cell arteritis, endarteritis obliterans due to tubercle, syphilis, etc. (c) Trauma—Penetrating injuries, cervical spondylosis, cervical manipulation, yoga. (d) Aortic arch syndromes

lowing the dose, aggravation of ocular signs, acute tracheitis and oesophagitis, cancer. (iii) Cancer may occur in children.

**General treatment:**

1. *Rest*—Both physical and mental.
2. *Sedatives*—Diazepam 2.5–5 mg. t.d.s.
3. *Vitamins*—in adequate doses.
4. *Psychotherapy*—for anxiety neurosis.
5. *Thyroid crisis*—(i) Hydrocortisone 100 mg. I.V. 8 hourly. (ii) Chlorpromazine 50 mg. with pethidine 10 mg IM or phenobarb 180 mg. IM to control excitement or mania. (iii) Oxygen. (iv) Sodium iodide IV—2 gms every 12-24 hours. (v) Fluids parenterally. (vi) Propranolol 60-120 mg for 48 hours subsequently reducing the dose.
6. *Malignant exophthalmos*—(a) *Of eye signs*—Dark glasses, methylcellulose eye drops for grittiness and soreness of eyes. 5% guanethidine eye drops for lid retraction. For swelling of eyelids elevation of head of bed and diuretics. For failure of visual activity 60 mg. prednisolone daily or locally retrobulbar injection of methyl prednisolone 10-15 mg. (b) *To inhibit TSH secretion*—Thyroid hormone —100-150 mcg of liothyronine per day or its equivalent of thyroxine. (c) *Surgical measures*—If no response occurs or if the eye disease progresses lateral tarsorraphy or orbital decompression.
7. *Cardiac complications*—Bed rest, digitalis and diuretics for cardiac failure. Propranolol 10-20 mg. t.d s. is useful for patients who present with disabling tachycardia, arrhythmia and palpitation pending response to anti-thyroid drugs. Digitalis if rapid atrial fibrillation, if cardiac rhythm does not return to normal after hyper-thyroidism has been corrected try cardioversion.
8. *Muscle wasting*—Anabolic steroid such as norethandrolone 25 mg. once a week intramuscularly. Good results with propranolol in thyrotoxic myopathy.
9. *Localised myxoedema*—If lesions extensive local corticos-teroid cream applied nightly under occlusive polythene dressings.

## Hypothyroidism

**Definition**—Clinical condition resulting from decreased circulating levels of T4 and/or T3. When the hypothyroidism is of severe degree and of long-standing it is seen as myxoedema

ing respiration. (ii) Nasolabial fold obliterated. (iii) Corneal reflex diminished. (iv) Pain stimulation less effective. (v) More absolute flaccidity of limbs (dropping tests). (vi) Paralysed leg extended and assumes position of external rotation while healthy one tends to be semiflexed. (vii) Pupil large on side of hemorrhage. (viii) Eyelid release test—Eyelid slides down slowly after both the eyelids are pulled up and released simultaneously. (ix) Temperature of paralysed side usually higher.

**Investigation and diagnosis of a case of cerebro-vascular accident:**

I. **History**—

1. *History of previous minor episodes*—may suggest disease of carotico-vertebral system, of embolic disease from these arteries or from the heart, of progressive cerebral arteriosclerosis or effects of hypertension. History of migraine or epilepsy in young patient may suggest intracranial arterio-venous malformation. History of coronary heart disease, intermittent claudication, bleeding tendency, diabetes or of symptoms suggesting intracranial tumor should be elicited.
2. *History of head injury*—Depressed fracture and subdural hematoma.
3. *History of drugs*—e g., contraceptive pills, hypotensive drugs, anticoagulants.
4. *Family history*—History of strokes and an early age of onset may suggest familial trait to early atherosclerosis.
5. *Past history*—of diabetes, hypertension or cardiac disease, or of anaemia or fluid loss which may serve as precipitating factors.
6. *Symptoms*—
   (a) *Mode of onset*—Catastrophic in hemorrhage, progressive in thrombosis, instantaneous in embolism.
   (b) *Transient hemiplegia*—or transient focal neurological disturbance may be due to transient cerebral ischemia, embolism from the heart, migraine, epilepsy, structural intracranial disorders such as tumor, chronic subdural hematoma, giant aneurysm or angioma; polycythemia, thrombocythemia or sickle cell disease Anaemia. Hyperviscosity syndromes. Hypoglycemia Hypertensive encephalopathy. Hysteria. Paroxysmal

5. *Alimentary*—Anorexia, constipation, hypo- or achlorhydria. Subnormal appetite and thirst. Liver may be enlarged and palpable probably due to mucinous infiltration.
6. *Anaemia*—may be one of three types—(a) Macrocytic hypochromic due to blood loss from menorrhagia. (b) Macrocytic due to associated vitamin $B_{12}$ deficiency or (c) Normocytic, normochromic (most common) which may respond to thyroxine alone. (d) hyperchromic megalocytic high colour index anaemia which responds to vitamin $B_{12}$. (e) simple hypochromic macrocytic high colour index anaemia on which thyroid has a specific effect.
7. *Generative organs*—Hypomenorrhoea; occasionally excessive and irregular bleeding.
8. *Miscellaneous*—Impairment of smell, taste and hearing may be present; hoarse husky voice due to thickening of vocal cords Nails striated and tend to break; hypotonia of muscles. Generalised aches and pains.
9. *Myxoedema coma*—Arises in longstanding severe cases. Patient comatose or nearly so, hypothermic and bodily processes at such a low tempo that life is just sustained. High mortality.

**Diagnosis:**

1. *Serum T4 with T3 uptake tests*—values below normal.
2. *Serum TSH*—Concentration raised above 20 mu/litre and exceeds 500 mu/litre in severe or longstanding cases. A normal value might suggest secondary (pituitary) hypothyroidism.
3. *TRH test*—Failure of response excludes primary hypothyroidism.
4. *Serum cholesterol*—Elevated in primary thyroidal failure. A fall in serum cholesterol level of more than 50 mg. per 100 ml in response to thyroxine treatment is good retrospective evidence of primary thyroidal failure.
5. *Electrocardiogram*—Bradycardia, low voltage complexes and flattened or inverted T waves. Marked improvement occurs with thyroxine treatment.
6. *Tendon reflex duration*—Tendon reflexes are prolonged. Measurement of the duration of the Achilles reflex (by photomotogram) may be helpful also in assessing the effectiveness of treatment.

2. *Speech*—should be evaluated to differentiate between slurred dysarthric speech and dysphasic speech. The former is more likely to be found in diseases of brain stem, the latter in involvement of dominant cerebral hemisphere.
3. *Neck rigidity*—in subarachnoid hemorrhage, and meningitis.
4. *Eyes*—(a) *Movements*—Most spontaneous nystagmus and unusual eye movements are due to brain stem disease, but eye deviation away from the side of hemiparesis is common with recent infarction in middle cerebral artery territory. Eyes deviated to side of hemiplegia suggest pontine lesion (b) *Pupils*—Ipsilateral Horner's syndrome may be found in acute carotid thrombosis but may also indicate brain stem disease. Pupillary enlargement occurs in early paralysis of 3rd cranial nerve associated with aneurysm or temporal lobe herniation (c) *Fundi*—for early papill-oedema, optic atrophy, emboli in retinal arteries, subhyaloid hemorrhage.
5. *Unilateral weakness*—Noting whether leg is weaker than the arm, or whether the face is weak on the same side as arm or leg weakness helpful for localisation of infarction.

B. GENERAL—

1. *Blood pressure*—for arterial hypertension. B P. should be checked in both arms because of possibility of aortic arch syndrome or subclavian steal syndrome
2 *Heart*—for cardiac arrhythmia such as atrial fibrillation, or recent myocardial infarction, atrial myxoma or valvular disease.
3. *Arterial pulses*—(a) For peripheral vascular disease. (b) In neck—for carotid artery stenosis. (c) Temporal arteries—Absent pulsation in external carotid occlusion. Tortuous in atheroma. Tender thickened, poorly pulsatile in cranial arteritis. Tortuous dilated highly pulsatile temporal artery when the artery is feeding an arteriovenous malformation, or a meningioma.
4. *Bruits*—due to stenosis Over carotid and subclavian arteries, bruit produced by stenosis in vertebral arteries. Auscultation of orbit or skull if intracranial arteriovenous malformation or arteriovenous shunt.
5. *Signs of head injury.*
6. *Ophthalmodynamometry*—for recording ophthalmic artery pressure A difference in the pressure of the two ophthalmic

2. *Vitamin D deficiency*—(a) Dietary leading to rickets in childhood. (b) Osteomalacia in adults. (c) Intestinal malabsorption syndrome.
3. *Vitamin D resistance*—(a) Idiopathic. (b) Renal tubular syndromes with phosphaturia (c) Renal glomerular failure.
4. *Alkalosis*—(a) Hyperventilation. (b) Excessive vomiting with chloride loss. (c) Excessive sodium bicarbonate therapy for peptic ulcer. In alkalosis the total serum calcium is normal but ionic calcium is reduced.
5. *Citrate tetany*—during blood transfusion. Ionic calcium reduced but total plasma calcium normal.
6. *Other causes*—Acute pancreatitis, low plasma protein concentration (with normal ionized calcium).

Hypocalcemic tetany is aggravated during menstruation, pregnancy and lactation. In chronic renal failure with hypocalcemia, acidosis protects against tetany which occurs when acidosis is corrected.

II. NORMOCALCEMIC, HYPOMAGNESIMIC TETANY.

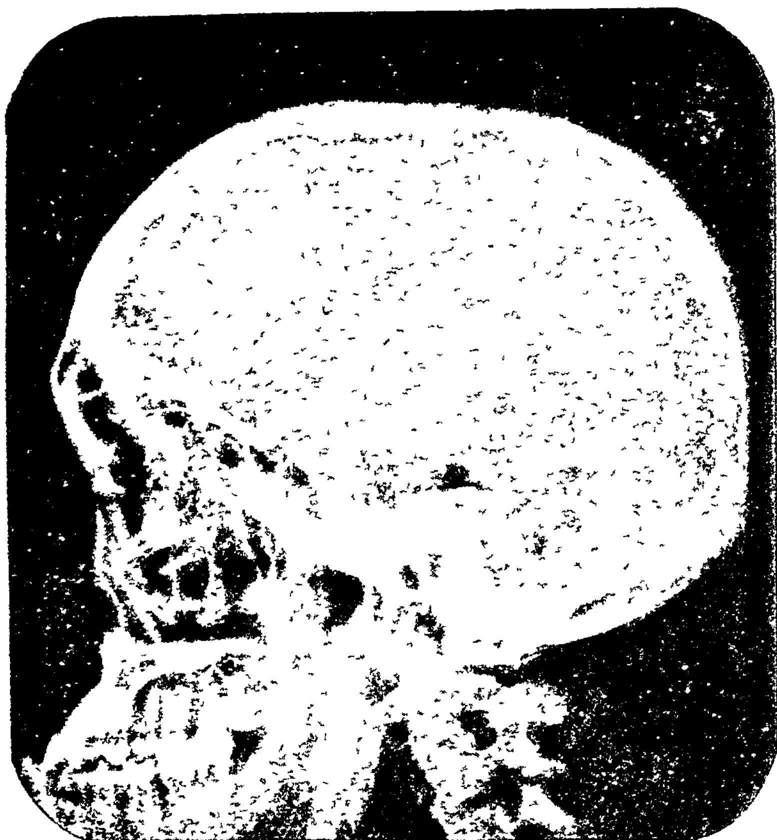
**Clinical features:** of hypocalcemia—

MANIFEST TETANY—

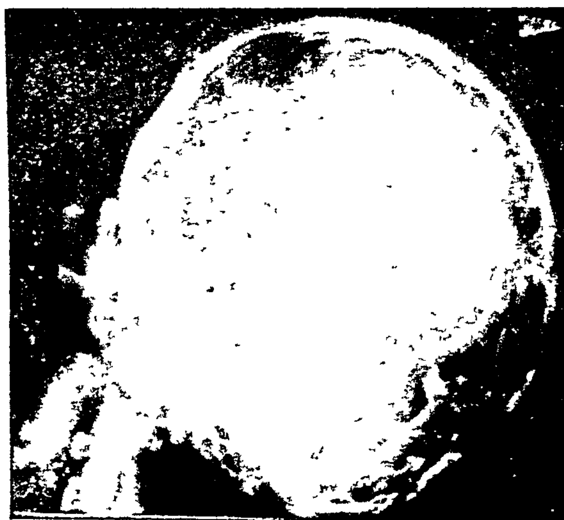
1. *Paraesthesia and muscular spasms*—Numbness and tingling, cramps of calf muscles, tonic muscular contractions sometimes with severe pain, muscular twitchings and carpopedal spasm. Less commonly spasm of masseters and facial muscles produces 'risus sardonicus'. Rarely spasm of diaphragm with cyanosis and dyspnoea. Laryngismus stridulus in infants Paroxysms of spasms may last for minutes or hours.
2. *Convulsions*—Epileptiform attacks may occur, or typical migraine. Generalised spasms may cause loss of consciousness.
3 *Gastro-intestinal symptoms* —Abdominal cramps and vomiting, gall stone like colic due to spasm of biliary passages.
4. *Respiratory symptoms*—Hoarseness and laryngeal stridor may result from laryngeal spasm.

LATENT TETANY: *Clinical tests*—

1. *Trousseau's sign*—Carpo-pedal spasm produced by compressing the upper arm with a sphygmomanometer cuff and maintaining the B.P. above the systolic pressure for 1 to 5 minutes.



Acromegaly Skull shows enlargement of sella turcica and of the frontal sinuses, generalised thickening of skull bones and prognathism



"Beaten silver" appearance of skull due to irregular thinning of the cranial vault from long-standing increase of intracranial pressure

2. *Drugs which raise serum calcium*—(a) *Vitamin* $D_2$ (Calciferol)—50,000 to 100,000 units daily therapy of choice. (b) *Dihydrotachysterol* (A T. 10)—raises serum calcium by increasing its absorption. Dose 0.5 ml. t.d.s (25 ml. of A.T. 10 = 100,000 units of Vitamin D). More toxic than calciferol, but like parathyroid hormone, patients do not become refractory to it; useful if there is continued lack of response to calciferol. Contraindicated in rachitic tetany. Toxic symptoms of overdosage—Headache, nausea, vomiting. Long continued overdosage may cause albuminuria and metastatic calcification in the kidneys or stone formation. (c) 1,25-DHCC or one alpha-hydroxycolecalciferol 1-2 $\mu$ g/day has advantage of rapid control of plasma calcium.
3. *Low phosphorus diet*—Less meat, fish, nuts, milk, cheese, eggs, cereals and pulses.
4. *Parathormone*—cannot be given for long periods because the body becomes refractory to it.

PSEUDOHYPOPARATHYROIDISM—Syndrome believed to be due to defect of kidney tubules making them refractory to action of parathormone. These patients show physical signs of hypoparathyroidism plus they are short and obese with tendency for centripetal fat distribution, may exhibit peculiar skeletal disturbances with marked shortening of 4th and 5th metacarpals Diagnosis is made by demonstrating hyperphosphatemia, low serum calcium and failure to respond to IV parathormone (200 units) which produces tenfold increase in phosphate excretion in urine in hypoparathyroidism and less than three fold in pseudohypoparathyroidism.

PSEUDOHYPOPARATHYROIDISM—Cases with many clinical features of pseudohypoparathyroidism but without clinical or biochemical evidence of hypoparathyroidism

## Hyperparathyroidism

**Causes:**

1. *Primary*—due to parathyroid adenoma, generalised hyperplasia or rarely carcinoma.
2. *Secondary*—due to increased physiological demand for hormone in part response to low serum calcium—Chronic renal failure, pregnancy, lactation, vitamin D deficiency.
3. *Tertiary*—Development of parathyroid tumors against a background of prolonged secondary hyperparathyroidism due to renal-glomerular failure or malabsorption syndrome with osteomalacia.

**Clinical features:** of primary hyperparathyroidism.

1. *Age and Sex*—Parathyroid tumors are 3 times more common in women than in men. Incidence increases with age, most common in post-menopausal women.

*Computerized tomography*—Indicated in all TIAs and if diagnosis of cerebrovascular disease is uncertain. Intracranial hemorrhage can be confirmed if it is greater than about 0.5 cm in diameter, also cerebral infarction of similar size. Structural lesions will be revealed.

*Cerebral arteriography*—(a) In acute stroke only if due to subarachnoid hemorrhage for subsequent surgery. (b) After recovery from stroke or TIA—to demonstrate operable stenotic and/or ulcerating lesions of internal carotid artery at its origin. It may also reveal complete occlusion of the internal carotid artery, stenosis of carotid siphon, or middle cerebral artery stenosis/occlusion, lesions which may all be amenable to bypass surgery. If an operable lesion of proximal internal carotid artery is found, it may be helpful to have the other vessels examined by either arch angiography or selective angiography of the contralateral carotid artery and vertebral arteries.

**Differential diagnosis of vascular causes—**

| | *Embolism* | *Thrombosis* | *Hemorrhage* |
|---|---|---|---|
| 1 *Age* ... | Young | Middle or old | Middle age or old |
| 2 *Nature of onset* | Instantaneous | Sudden or progressive | Catastrophic |
| 3 *Premonitory symptoms* | Absent | Difficulty in speaking or weakness of arm or leg may be first symptoms | Usually absent |
| 4 *Common cause* | Mitral stenosis with atrial fibrillation, carotid stenosis | Arteriosclerosis with or without hypertension | Hypertension almost invariable |
| 5. *Clinical features:* | | | |
| Headache .. | Variable | Slight or absent | Severe |
| Vomiting at onset | Rare | Rare | Common |
| Convulsion .. | Common | Rare | Common |
| Coma ... | Rarely deep | Varies with extent of thrombosis | Deep unconsciousness |
| Cheyne-Stokes respiration or laboured breathing | Not common | Seldom | Common |

distal phalangeal tufts. (ii) Multiple bone cysts. (iii) Loss of lamina dura round the teeth. (iv) Mottling of skull (pepperpot skull). (v) Demineralization usually patchy. In skull mottled appearance. (vi) Destructive bone lesions single or multiple, solid or cystic. They cause sharply demarcated areas in affected bones. (b) Calcium deposits in the kidneys with or without renal calculi.

4. *Hydrocortisone suppression test*—120 mg. hydrocortisone or 10 mg. prednisolone 8-hourly for 10 days. In patients with primary hyperparathyroidism the plasma calcium level does not usually fall, in most other hypercalcemic conditions there is marked fall.

**Differential Diagnosis:**

1. DIFFERENTIATION FROM OTHER CAUSES OF HYPERCALCEMIA—
   (a) *Hyperparathyroidism*—Primary, associated with chronic renal failure.
   (b) *Malignant hypercalcemia*—Bony metastases, multiple myelomatosis and other hematological malignancies, humoral hypercalcemia of malignancy.
   (c) *Vitamin D intoxication*—Self-medication with vitamin preparation, accidental overdosage, milk-alkali syndrome.
   (d) *Increased sensitivity to small doses of vitamin D*—Sarcoidosis, some cases of idiopathic hypercalcemia in infancy.
   (e) *Other causes*—Thyrotoxicosis, immobilization, acute renal failure (polyuric recovery phase), familial hypocalciuric hypercalcemia, Addison's disease.
2. DIFFERENTIAL DIAGNOSIS OF POLYURIA (and polydipsia).
3. DIFFERENTIATION FROM OTHER SKELETAL DISEASES—(a) *Osteoporosis*—Generalised decalcification especially of vertebrae in post-menopausal women, old age, enforced disuse, corticosteroid therapy. Plasma calcium, phosphorus and alkaline phosphatase normal. (b) *Rickets*—Wide and irregular epiphyseal line. Ill-nourished children. (c) *Osteomalacia*—Generalised decalcification in young women on inadequate diet. Plasma calcium, phosphorus and alkaline phosphatase show diagnostic changes (d) *Osteogenesis imperfecta*—Bones thin, not obviously decalcified. Familial, China-blue sclerotics, otosclerosis, spontaneous fractures. (e) *Paget's disease*—Patchy decalcification with new bone formation. Changes usually confined to skull, spine,

| | |
|---|---|
| *Brainstem* | Upper level—Weber's syndrome—3rd nerve palsy with crossed hemiplegia. |
| *Midbrain* | Lower level—Benedict's syndrome (upper red nucleus syndrome)—3rd nerve affection on side of lesion with tremors, hypertonia and ataxy on opposite side. |
| *Pons* | (a) Millard-Gubbler syndrome: Nuclear type of facial paralysis with crossed hemiplegia.<br>(b) Foville's syndrome: Facial paralysis, involvement of 6th nerve and crossed hemiplegia<br>(c) Horner's syndrome—Paralysis of the ocular sympathetic may result from a lesion in the tegmentum of the pons. |
| *Medulla* | (a) Medial medullary syndrome (Dejerine's syndrome)—Ipsilateral flaccid tongue weakness, contralateral hemiplegia and contralateral loss of position and vibration sense (from infarction of medial lemniscus).<br>(b) Lateral medullary syndrome (Wallenberg's syndrome)—Abrupt onset with vertigo (vestibular nucleus), dysphagia (N. ambiguus), ataxia (inferior cerebellar peduncle). On examination ipsilateral anaesthesia of face (descending tract of 5th nerve), and contralateral of limbs and trunk (spinothalamic tract), Horner's syndrome (descending sympathetic fibres), nystagmus (vestibular nerve and cerebellar fibres), ipsilateral intention tremor (inferior cerebellar peduncle). |
| *Temporal lobe* | (a) Deep posterior temporal lobe—Pyramidal fibres pass in close proximity to visual fibres hence hemiplegia usually associated with homonymous hemianopia or upper quadrantic field defect (b) Anterior temporal lobe—On the dominant hemisphere the pyramidal system lies just medial to the speech fibres, hence hemiparesis associated with expressive aphasia. |
| *Spinal cord* | Unilateral lesion of the cortico-spinal tract below the medulla and fifth cervical segment produces spinal hemiplegia involving the limbs of the affected side but without paralysis of muscles innervated by cranial nerves. |

With improvement 20 mg. hydrocortisone by mouth 6-8 hourly. Additional IV glucose if low blood sugar level.

### Primary adreno-cortical insufficiency (Addison's Disease)

**Definition**—Addison's disease or primary hypoadrenalism results from destruction of adrenal cortex by a variety of pathological processes.

**Etiology:**

(1) Age—usually 30 to 40. (2) Sex—more in females. (3) *Causes*—(i) Common—(a) Autoimmune adrenalitis. (b) Tuberculosis. (c) Bilateral adrenalectomy for malignant disease (e.g. of breast) or for Cushing's syndrome. (ii) Rare—Secondary deposits, granulomatous disease, amyloidosis, hemochromatosis, fungal disease (e.g. histolplasmosis); congenital adrenal hyperplasia, meningococcal septicemia, hemorrhage into adrenals, e.g., in newborn or as complication of anticoagulant therapy, adrenal vein thrombosis after trauma or adrenal venography.

PATHOGENESIS—of symptoms

1. *Increased secretion of ACTH* (the lowered cortisol secretion acts by negative feedback to increase ACTH production). Enhancement of melanin pigmentation of skin and hair due to direct action of ACTH on melanocytes.
2. *Deficiency of adrenal cortical secretions*—
   (a) *Aldosterone*—Hypotension, serum sodium reduced because of increased loss of sodium in urine. Since the sodium exchanges, at the renal tubular level, for potassium and hydrogen, there will be marked potassium retention and moderate acidosis
   (b) *Androgens*—Loss of pubic and axillary hair in females, loss of muscle mass, weakness and loss of libido.
   (c) *Cortisol*—Weakness, anorexia, nausea and vomiting. Diarrhoea due to achlorhydria. Normocytic, normochromic anaemia and low hemoglobin. Neutropenia with relative lymphocytosis and tendency to eosinophilia. Moderate hypoglycemia. Inadequate water diuresis.
   Dizziness and postural hypotension can result from either cortisol or aldosterone deficiency or both.

**Clinical features:**

*Onset*—usually insidious. Rarely first manifestation may be acute crisis.

cubitus ulcers. Appropriate antibiotics should be given at the first sign of pyuria.

6. *Care of the eyes*—Antibiotic drops to prevent exposure keratitis.
7. *Passive movements*—should be commenced from the first day to prevent contracture (especially at the shoulder) and also to decrease risk of leg vein thrombosis.

B. TREATMENT OF ASSOCIATED CONDITIONS—

1. *Cardiac condition*—Treatment of arrhythmias or of left ventricular failure.
2. *Diabetes*—Strokes are more frequent in patients with diabetes. Care should be taken to avoid hypoglycemia.
3. *Blood pressure*—It is not uncommon to have an initial high B.P. reading in patients with acute cerebrovascular episode. In the acute stage it is not desirable to change the pressure drastically unless severe hypertension (190/110 mm Hg or above), or hypotension (below 90/60 mm Hg) is present With loss of autoregulation in the ischemic zone, reduction of mean arterial blood pressure may decrease cerebral blood flow.
4. *Infection*—Appropriate antibiotics for pulmonary or urinary infection. Antipyretic agents like paracetamol to lower temperature since with rise of body temperature there is an increase in metabolic demands and cerebral oxygen consumption.

C. PRIMARY TREATMENT—

1. *Cerebral vasodilator drugs*—e.g., cyclandelate, isoxuprine or hexobendine. Objection to their use is the possibility of causing an 'intracerebral steal' in the acute stage of infarction. With an increase in CBF in healthy areas there is decrease of CBF in the infarcted zone.
2. *Cerebral vasoconstrictor drugs*—Aminophyllin may augment CBF my producing an 'inverse steal syndrome' and shunting blood to the ischemic zone.
3. *Use of $CO_2$ and $O_2$*—5% $CO_2$ with 40% $O_2$ is beneficial in milder forms of stroke and can be given for 10 to 15 minutes every one hour. This treatment should be deferred until after 48 hours of cerebral infarction
4. *Measures to reduce cerebral oedema*—(a) *Mannitol*—350 ml of 20% aqueous solution IV over 60-90 minutes. (b) *Glycerol*—1.5 g/kg of body weight every 24 hours in 3-4 divided doses mixed with fruit juice to mask the unpleasant

anxiety, reduction in dosage of corticosteroids and diarrhoea are other causes. *Warning signs*—Yawning, hiccough, photophobia, increased sensitivity to cold or actual shivering with the patient curling himself up beneath blankets, and irritability

*Secondary adrenocortical insufficiency*: due to pituitary or hypothalamic diseases such as tumors, infarction, trauma, granuloma or necrosis. Symptoms and signs identical to Addison's disease except absence of pigmentation. Features associated with hypotension are unusual since aldosterone secretion is maintained despite absence of ACTH

**Diagnosis:**

A. Of Addison's disease:

1. *Plasma cortisol level*—measured between 8 a.m. and 10 a.m., $< 6\ \mu g/100$ ml confirms diagnosis of adrenocortical insufficiency.
2. *Plasma ACTH level*—Increased in Addison's disease. Normal or low in secondary adrenal failure.
3. *Short synacthen test*—indicated in mildly pigmented patient complaining of lassitude. Take blood for plasma cortisol, then give 250 $\mu$g synacthen IM. Take blood samples for cortisol at 30 and 60 minute intervals. In normal subjects plasma cortisol $> 60\ \mu$g/litre and rise by at least 70 $\mu$g/litre to over 210 $\mu$g/litre. If the result of the test is abnormal or equivocal a depot synacthen test should be performed.
4. *Depot synacthen test*—Take blood for plasma cortisol (preferably at 9 a.m.), then give 1 mg of synacthen depot IM. Take further blood samples at 1, 4, 8 and 24 hours for cortisol estimation. In Addison's disease cortisol response is suppressed throughout and does not exceed 210 $\mu$g/litre whereas in secondary adrenal atrophy (e.g. hypopituitarism or long-term steroid therapy) a delayed but usually normal response is observed.

   Other tests—Elevated urea and potassium, lowered sodium and chloride.

B. Of the cause:

1. *Radiography*—(a) Of abdomen—may reveal calcified adrenals of tuberculous disease. (b) Chest—may show tuberculous lesion or malignancy.
2. *Adrenocortical auto-antibodies*—in 80% of women but only 10% men with auto-immune adrenalitis.

re-education and joint exercises are initiated when the first signs of recovery are noted. Massage is given as adjuvant to active exercises. It is important to introduce standing as an exercise soon since weight bearing stimulates the maintenance of extensor tone in the lower limbs and on this the ability to walk depends. If the patient can stand unsupported, he is ready for gait training.

F. TREATMENT OF APHASIA—Language training, training of left hand in performance of voluntary movement in right handed patients.

## VENOUS INFARCTION

Thrombosis of cortical veins and/or dural sinuses is less common than arterial occlusion.

*Causes*—Dehydration, pyogenic middle ear or sinus infection, pregnancy and puerperium, polycythemia, hyperviscosity syndromes, septicemia, ulcerative colitis, severe iron deficiency anaemia, head injury.

*Clinical features*—Onset is sudden commonly with focal epilepsy. Raised intracranial pressure develops rapidly if there is obstruction of the dural sinuses. A focal neurological deficit develops which can be clinically indistinguishable from a stroke due to arterial occlusion.

*Treatment*—Antibiotics—if sinus thrombosis is infective in origin. IV low molecular weight dextran. Anticoagulants—the risks outweigh any theoretical benefits.

## SUBARACHNOID HEMORRHAGE

**Causes:**

1. Rupture of congenital berry aneurysm or angioma. In order of frequency the aneurysms arise from anterior cerebral arteries, internal carotid intracerebrally, middle cerebral and from the basilar system.
2. Traumatic.
3. Rupture of a mycotic aneurysm.
4. Cerebral or cerebellar hemorrhage rupturing into the ventricles.

### Spontaneous subarachnoid haemorrhage

**Clinical features:**

1. BEFORE RUPTURE—in some cases of aneurysm. Migraine, focal symptoms like transitory attacks of blindness, monoplegia, cranial nerve palsies, or trigeminal anaesthesia.

urea, and of over-treatment hypertension, oedema and hypokalemia.

(c) *Salt*—Patients with curtailed food intake, diarrhoea or profuse sweating should be given an additional 3-6 gms. of sodium chloride daily.

TREATMENT OF CRISIS—Hydrocortisone 100 mg. I. V. at once, thereafter 100-300 mg. slowly in next 24 hours in 2-3 litres of saline drip containing 50 gm glucose. Oral medication can usually be started after 24-36 hours and reduced over 3-4 days to maintenance dose.

## ADRENAL CORTICAL HYPERFUNCTION

### Cushing's syndrome

**Definition**—Cushing's syndrome results from increased circulatory levels of either endogenous or exogenous cortisol.

**Causes:**

1. *ACTH excess*—(a) Cushing's disease. (b) Ectopic ACTH syndrome—Malignant or benign non-endocrine tumors. (c) Iatrogenic—Corticosteroid administration for inflammatory or immunological disorders.
2. *Cortisol excess*—(a) Adrenal adenoma or carcinoma. (b) Corticosteroid administration.

**Clinical Features:**

1. *Muscle weakness and wasting*—Marked especially in quadriceps femoris group. Few patients can rise normally from squatting position.
2. *Skin changes*—Skin thin and its transparency produces red cheeks. Disappearance of elastic fibres coupled with stretching owing to abnormal accumulation of fat produces depressed red-to-purple striae over abdomen, buttocks, and upper thighs and even down the arms. Skin bruises easily with numerous ecchymosis. Acne common. Hirsutism.
3. *Abnormal fat accumulation*—Moon face, pendulous abdomen and fat pads supraclavicularly, and over seventh cervical vertebra (buffalo hump). Characteristically the arms and legs are thin (truncal obesity).
4. *Poor wound healing*—and high susceptibility to infection
5. *Severe osteoporosis*—may lead to vertebral compression (codfish vertebrae), fractures and dorsal kyphosis, as well as rib fractures.

Risk of recurrent hemorrhage reaches its peak between 10th and 14th days after initial rupture.

*Skull radiograph*—Shift of pineal gland (if calcified) when there is a large hematoma.

*CT scan*—Routine use of CT scanner in investigation in case of spontaneous intracerebral hemorrhage has reduced considerably the requirement for angiography.

3. AFTER RECOVERY—Metabolic changes due to release of catecholamines produce ischemia of hypothalamus, kidneys and heart. Hence glycosuria, high blood pressure, ECG changes. Vascular spasm may produce drowsiness, confusion, hemiplegia and aphasia.

**Prognosis:** About one-third die in first attack; of survivors about half have recurrence within 2-4 weeks Tendency for interval between successive hemorrhages to become shorter. Prognosis better with angioma than with aneurysm.

**Management:**

1. *Medical*—(a) General—Bed rest with head slightly elevated. If an aneurysm has been demonstrated and patient is not suitable for surgery, a minimum of 4 weeks of complete rest in bed will probably reduce risk of recurrent hemorrhage. (b) Reduction of increased intracranial pressure as indicated by headache, convulsions or stiff neck. Spinal puncture is done only for diagnostic purposes. Repeated lumbar punctures may give rise to a new leakage. (c) Symptomatic treatment—Luminal or diazepam for headache and restlessness.

2. *Surgical*—Cerebral angiography should be done as soon as possible after the initial hemorrhage because there is often only a short interval between the initial bleeding and a subsequent one that may be fatal. If an aneurysm is localised, ligation of internal carotid or common carotid artery in neck. Indications for ligation—(i) Young patients with severe initial hemorrhage or early recurrences. (ii) Subdural hematoma following ruptured aneurysm If vascular anomalies which usually lie on the surface of the brain, their surgical removal should be attempted.

## 13. COMA

**Definition**—A state of unarousable unresponsiveness or absence of any psychologically understandable response to external stimuli or inner need. Consciousness implies intact

No suppression in ectopic ACTH syndrome or with adrenal tumors.

3. *Metyrapone test*—Metyrapone blocks end stage adrenal cortisol synthesis so that cortisol falls and patient secretes more ACTH. This can be measured indirectly by measuring total urinary 17-OGS. Metyrapone 750 mg. is given every 4 hours for 24 hours. Rise of urinary 17-OGS of about 20 mg/24 hours on the second day suggests pituitary ACTH dependant disease. In patients with primary adrenal disease and ectopic ACTH syndrome usually no increase, or fall.

4. *Catheter studies*—Plasma ACTH may be measured in blood obtained through a catheter inserted via the femoral vein into all accessible great veins. Thus elevated levels in high jugular position compared with simultaneous peripheral samples suggest pituitary origin, whereas high levels elsewhere suggest ectopic ACTH syndrome.

5. *Radiology*—(a) Skull—may reveal enlargement of pituitary fossa in Nelson's disease and 20% of patients with Cushing's disease. (b) Chest—may show bronchogenic carcinoma (c) CT scan—for confirming presence of adrenal tumor and indicating side affected, or of bilateral hyperplasia.

**Treatment:** Depends on the cause—Removal of adrenal tumor followed by radiotherapy to tumor bed if malignant. If metastases, specific adrenolytic drug op'DDD upto 9 g daily. Metyrapone should be used to control cortisol overproduction (medical adrenalectomy) and for preparing patient for surgery Dose 150-1000 mg. t.d.s. In pituitary Cushing's disease metyrapone therapy is combined with pituitary irradiation to reduce ACTH secretion.

## II. Adrenogenital syndrome

*Clinical features*—of an excess of adrenal androgens may vary from slight hirsutism in the adult female to adrenocortical virilism. The manifestations depend on the age and sex of the individual—(a) *In new-born infants*—When the foetus is exposed to excessive androgens there is pseudoprecocious puberty in the male and pseudohermaphroditism in the female (b) *In children of either sex*—Precocious puberty of the male type, including muscular development and accelerated epiphyseal maturation. (c) *In the adult female*—Virilization with enlargement of clitoris, premature axillary and pubic hair, muscular

| | *Pupils* | *Respiration* | *Eye movements* | *Motor signs* |
|---|---|---|---|---|
| UNCAL HERNIATION | | | | |
| Early | Ipsilateral pupil dilated but often fixed | Often normal | Often full | May be normal |
| Moderate | Dilated, sluggish or fixed | Cheyne-Stokes | May be III n palsy | Hemiparesis Decorticate posturing |
| Advanced | Fixed, dilated | Central neurogenic | III n palsy | Decerebration |
| CENTRAL HERNIATION | | | | |
| Diencephalic | Small, reactive | Normal or Cheyne-Stokes | Usually full, Cold caloric stimulation produces tonic deviation | Unilateral or bilateral |
| Midbrain/pontine | Fixed, midsized | Central neurogenic | Sluggish; incomplete response to oculocephalic and cold caloric stimulation | Decerebrate posturing |
| Medullary | Fixed | Ataxic | Absent | Flaccid |

II. **Local brain-stem lesion—**

1. Infarction of brain stem may cause rapid onset of coma.
2. Abnormalities of pupil responses and eye movements are present from the onset and orderly sequence of changes caused by herniation is not seen. Pupils may be fixed and counter rolling of head may reveal dysconjugate eye movements and loss of gaze in one direction. Pontine hemorrhage produces pin point pupils, loss of eye movements and hyperthermia.
3. Cranial nerve signs.
4. Bilateral long tract signs.

III **Metabolic coma—**

1. Absence of signs of focal lesion in CNS (except hypoglycemia).

or hours. Usually brought on by emotional strain, or palpation of abdomen, or sudden change in posture such as lying on one or other side in bed at night. Accompanied by extreme nervousness with anxiety, sweating and headache, and terminating in profound weakness, exhaustion and often nausea. The B.P. is raised during the attack and may be extremely high, occasionally precipitating a cerebro-vascular accident, a fit, myocardial infarction or death from ventricular fibrillation (b) *Sustained hypertension*—Some tumors secrete adrenaline and/or noradrenaline constantly causing persistent hypertension. Suspicion aroused if signs of hyperthyroidism, intermittent glycosuria or frank diabetes.

2. HYPERMETABOLIC STATE—produced particularly by adrenaline. Episodes of apprehension and anxiety, palpitation, attacks of sweating and flushing

**Diagnosis:**

1. BIOCHEMICAL TESTS · Increased excretion of catecholamines and metabolites—in urine—Vanilmandelic acid (VMA) normal 35 $\mu$ mol (7 mg)/24 hr. or metanephrines (normal 5.5 $\mu$ mol (1.0 mg)/24 hr., or total catecholamines (normal 0 36 $\mu$ mol/24 hr. (60 $\mu$g).
2. LOCALISATION—(a) *IVU with tomography.* (b) *CT scan and ultrasound examination* of adrenal areas. (c) *Scanning the adrenals following* 131 *Iodine* 19-*iodocholesterol* may demonstrate notching or other defects of adrenal image. (d) *Measurement of catecholamine concentration in venous blood* in inferior and superior vena cava not only useful for confirming site of tumor, but also serves to exclude or confirm existence of multiple or extradrenal tumors In essential hypertension catecholamine concentrations rarely exceed 1 $\mu$g/litre. In pheochromocytoma levels more than 4 $\mu$g/litre can be detected at localised sites with a progressive downstream gradient towards the heart. (e) *Aortography or renal arteriography*—may not always be informative. Patient with sustained or intermittent hypertension should be pretreated with phenoxybenzamine 30-90 mg/day or labetalol 200-800 mg/day 48 hours before the aortography. (f) *Venography or retroperitoneal air insufflation* are seldom helpful.

**Treatment**—Surgical removal of tumour. Between diagnosis and operation—Alpha blocker phenoxybenzamine (dibenyline) 10 mg b d orally increased to 30-40 mg b.d. or until B P. shows

10. *Past history*—Of diabetes mellitus, epilepsy, renal disease, cardiac or respiratory failure or of hypertension. Previous overdose attempts due to depressive illness.

B. **Physical examination**—

1. *General appearance*—flushed face in alcoholic, pale yellow in uremia, cherry red in carbon monoxide poisoning. Cold clammy skin suggests hyperinsulinism or morphine poisoning; pigmentation of skin and buccal mucosa in Addison's disease; petechiae in skin suggestive of cerebral embolism.
2. *Odour*—of alcohol, acetone in diabetes, ammoniacal in uremia, and of drug like cyanide. Foetor hepaticus in hepatic coma. Pungent odour in organo-phosphorus poisoning.
3. *Head*—Depressed fracture of skull may be palpable.
4. *Ears*—Blood may suggest basal fracture. Middle ear infection or tenderness and swelling over mastoid may indicate an intracranial abscess.
5. *Eyes*—(a) Jaundice in cholemia. (b) Soft eyeballs in diabetic acidosis. (c) Resistance to opening of eyes and rolling up of eye balls in hysterical coma. (d) Impairment of corneal reflex or grimace to pain, including from supra-orbital pressure, on one or other side of face, indicates a lesion of 5th or 7th nerve or of adjacent brain stem on that side. (e) Pupils—(i) Normally reacting pupils—Metabolic causes or drug overdosage (except glutethimide and amphetamine (dilated pupils) or opiates (constricted pupils). (ii) *Unequal* pupils—Unless proved otherwise, a dilated pupil indicates a herniated temporal lobe is stretching the 3rd nerve on that side. (iii) Bilateral dilated pupils—End stage of progressive tentorial herniation. Also glutethimide, atropine and amphetamine poisoning. (iv) Bilateral pinpoint pupils—Intrapontine hemorrhage, opiates.
6 *Ocular movements*—(a) *Predilection of gaze*—The eyes usually move randomly with mild metabolic coma to rest in the forward position as soon as coma deepens. A conjugate lateral deviation or dysconjugate positioning of eyes at rest suggests structural disease. Conjugate deviation of eyes and head in one direction suggests same hemisphere or opposite pontine lesion. (b) *Doll's eye movements*—The eyes are held open and the head is briskly rotated from side to side. A positive response is contra-

**Clinical features:**

*Onset*—Usually gradual in adults but acute in children.

*Modes of presentation*—

1. *With one or more of common symptoms*—Polyuria, intense thirst with perhaps nocturia, polyphagia, weight loss, weakness and lassitude, pruritus vulvae in females or balanitis in males, leg cramps, crops of boils, loss of libido and impotence in middle-aged males. Occasionally blurring of vision.
2. *Coma*—Onset with coma rare.
3. *Accidental discovery or asymptomatic glycosuria*—e.g. during life insurance examination.
4. *Symptoms due to complications*.

**Complications:**

1. *Metabolic decompensation*—Severe diabetic metabolic decompensation can be said to have occurred in the presence of either significant acidosis (bicarbonate$<$15 mEq/1 or 15 mmol/1), or of hyperglycemia with blood glucose 600 mg% (36 mmol/1).
2. *Vascular*—Arterio-sclerosis of coronary, peripheral or cerebral arteries, hypertension, microangiopathy.
3. *Ophthalmic*—Cataract, errors of refraction, iridopathy, retinopathy.
4. *Acute infections*—Tuberculosis, staphylococcal infections and acute infectious gangrene.
5. *Dermatological*—(a) *Specific lesions*—Diabetic dermopathy (spotted leg syndrome), necrobiosis lipoidica diabeticorum and bullosis diabeticorum. Granuloma annulare. (b) *Others*—Pruritus vulvae, boils and carbuncles, xanthomatosis and xanthoma diabeticorum, dermatitis gangrenosa.
6. *Neuropathy*—(i) *Symmetrical polyneuropathy*—(a) Sensory polyneuropathy. (b) Autonomic neuropathy. (ii) With multiple visceral involvement—(a) Cardiovascular—tachycardia, absence of sinus arrhythmia, postural hypotension. (b) Gastrointestinal—reduced oesophageal motility, gastric atony, diarrhoea, constipation, enlarged gall bladder. (c) Genito-urinary—bladder dysfunction, impotence, retrograde ejaculation, absence of testicular sensation. (d) Sudomotor—diabetic anhydrosis, gustatory sweating. (e) Vasomotor—peripheral vascular changes,

10. *Extremities*—(a) *Spontaneous movements*—of a patient's limbs should be carefully observed. Asymmetry of tone may indicate hemiparesis. A hemiparesis may also be manifested by unilateral lack of spontaneous or withdrawal movements as also asymmetry of the tendon jerks. (b) *Patient's posture at rest and response to painful stimuli*—(e.g., pressure over the sternum after the arms have been placed semiflexed on the abdomen), should be noted. In *decorticate posturing,* there is flexion of upper limbs and extension of lower limbs. This type of posturing occurs in patients with lesions of motor pathways above the level of the rostral midbrain. *Decerebrate posturing* consists of internal rotation of the arms and extension of both arms and legs and results from mass lesions post rostral to the vestibular nuclei of the pons, but is more often seen in the course of herniation from above. The side of hemiparesis may also be detected by withdrawal from a noxious stimulus on one side and decorticate posture on the other.
11. *Involuntary movements*—Asterixis, tremulousness and multiple myoclonic jerks are usually seen in patients with metabolic encephalopathies. Multifocal seizures may also occur in patients with uremia and metabolic hyperosmolar diabetic coma.
12. *Spleen*—may be palpable in cerebral malaria.
13. *Pulse*—Slow, full bounding pulse suggests increased intracranial pressure. Slow in morphine poisoning, brain tumor and Stokes-Adams syndrome. Irregular pulse may be found in valvular heart disease causing embolism.
14. *Temperature*—usually elevated in cerebral malaria and hemorrhage, sun stroke, septicemia. May be normal in morphine poisoning and uremia
15. *Sweating*—strikingly absent in heat hyperpyrexia.
16. *Blood pressure*—elevated in uremia or cerebral hemorrhage.
17. *Fundus*—Papilloedema in intracranial tumor or hypertensive encephalopathy; white patches and hemorrhages in uremia, changes of diabetic retinopathy.

C. **Laboratory investigations—**

1. *Urine*—for sugar, albumin and acetone.
2. *Blood*—Blood count. Estimation of blood glucose, electrolyte values including calcium. Blood urea. Blood levels

(d) Planned investigation. (e) To exclude presence of glucose intolerance. Performance of OGTT—A standard oral glucose load of 75 g in 250-350 ml of water for adults (1.75 mg/kg body weight for children). The test should be performed in morning after overnight fast following 3 days of adequate carbohydrate intake. A glucose tolerance test is unnecessary if the fasting blood glucose is found to be elevated.

*Two-hour blood sugar screen* (2HBSS)—This test is a simplified version of OGTT using a single blood glucose estimation made 2 hours after patient has consumed a 75 g oral glucose load. It can be performed at any time of day. 2HBSS can be diagnostic—(i) when the 2-hour value is below 100 mg/100 ml (6 mmol/litre), patient is normal. If it is above 215 mg/100 ml (12 mmol/litre), patient is diabetic. Standard OGTT is required if values fall between these two limits.

Diagnostic values—in mg/100 ml.

| | | Venous whole blood | Capillary whole blood | Venous plasma |
|---|---|---|---|---|
| Diabetes mellitus | Fasting | 120 | 120 | 140 |
| | 2HBSS | 180 | 200 | 200 |
| Impaired glucose tolerance | Fasting | 120 | 120 | 140 |
| | 2HBSS | 120-180 | 140-200 | 140-200 |

In absence of diabetic symptoms at least two abnormal values are required to establish diagnosis of diabetes mellitus.

Measurement of glycosylated haemoglobin (GHb)—provides an objective assessment of diabetic control. A falsely low GHb value is seen in hemolytic anaemia, blood loss or after recent blood transfusion.

**Management:** Aims—(1) To restore the disturbed metabolism of the diabetic as nearly to normal as is consistent with comfort and safety. (2) To prevent or delay progression of the short and long-term hazards of the disease. (3) To provide the patient with knowledge, motivation and means to undertake his own enlightened care.

I **Diet**—Aims: (i) Adequate caloric value, avoiding overnutrition. (ii) Balanced in regard to protein, carbohydrate and fat, in all cases it is necessary to restrict carbohydrate intake. (iii) Should conform as closely as possible to normal (iv).

in the region of the involved territory. (iv) Subhyaloid hemorrhage may be noted on fundus examination. (v) CSF—presence of blood.

3. *Hypertensive encephalopathy*—(i) Common in patients with acute hypertension as in eclampsia, pheochromocytoma or acute nephritis. (ii) Convulsions, either focal or generalised. (iii) Transient cerebral symptoms like blindness, aphasia or hemiplegia. (iv) Papilloedema. (v) Lumbar puncture—C.S.F. gushes out in a stream.

4. *Cerebral venous thrombosis*—Superior longitudinal sinus thrombosis occurs in relation to extra- and intracranial sepsis, debilitating diseases, dehydration, pregnancy, postpartum period, polycythemia, or in women taking contraceptive pills. Common clinical features include focal seizures, loss of sensation and movement in the legs (crural dominance), and features of raised intracranial pressure—headache, vomiting and papilloedema.

5. *Adams-Stokes syndrome*—(i) History of myocardial infarction. (ii) Giddiness, faintness and convulsions precede coma. (iii) Heart rate very slow.

6. *Shock*—due to injury or loss of blood. (i) Evidence of cause. (ii) Low blood pressure. (iii) Feeble pulse. (iv) Cold and clammy skin.

7. *Congestive attacks of G.P.I.* (syphilitic coma)—(i) Loss or severe impairment of speech. (ii) Paresis of face and arm of frank hemiplegia. (iii) Mental symptoms. (iv) Argyll-Robertson pupils. Trembling dysarthria after the attack.

**Metabolic disorders:**

1. *Diabetic coma*
2. *Uremia*

} See table.

3. *Hepatic coma*—(i) Preceding stage of acute hepatitis or cirrhosis. (ii) Severe jaundice. (iii) Liver may be palpable. (iv) Vomiting. (v) Headache, delirium, or convulsions. (vi) Hepatic foetor usually present when collateral vessels link portal (gut) with systemic (mouth) circulation.

4. *Hypoglycemic coma*—(i) History of taking insulin or spontaneous. (ii) Sudden onset. (iii) Headache common. (iv) Diplopia, apathy and confusion. (v) Muscular twitchings. (vi) Skin pale and moist. (vii) Deep reflexes brisk. (viii) Low blood sugar.

diabetic's weight should increase 5% above ideal body weight (Calories 2400).

(b) *Carbohydrate*—2 to 3 g per kilogram body weight to start with, and then increased to the ideal level of 250 g as the patient's tolerance improves.

(c) *Protein*—1 g per kilogram to an adult, 2 to 3 g per kg. to a growing child.

(d) *Fat*—the amount should be equal to that necessary to make up the total calories

SPECIMEN OF DIET FOR NORMAL WEIGHT DIABETIC:

| *Mixed diet* | *Vegetarian diet* |
|---|---|
| Proteins 90 g<br>Fats 60 g<br>Carbohydrates 180 g<br>Total calories 1700 | Proteins 65 g<br>Fats 50 g<br>Carbohydrates 225 g<br>Total calories 1700 |

Morning

Tea one cup with milk 2 tablespoonfuls and sugar from ration.

Breakfast

| | |
|---|---|
| Eggs 2 half-boiled or poached<br>Toast 1<br>Butter 1 teaspoon<br>Orange 1 | Milk 1 cup<br>Khakhra 4, or thin wheat chappatis 4, or puris 2<br>Butter 2 teaspoons<br>Orange 1 |

Lunch

| | |
|---|---|
| Mutton soup 1 cup<br>Roast mutton average helping or eggs 2<br>Boiled peas, 4 teaspoons<br>Cooked cauliflower<br>Bread 1 slice<br>Orange 1 | Mixed vegetable soup 1 cup<br>Cooked cauliflower or cabbage or spinach or pumpkin or lady's finger.<br>Dal (thin) 1 cup<br>Tomato and cucumber salad<br>Chappatis 2<br>Curd 1 cup<br>Orange 1 |

Evening tea

| | |
|---|---|
| Tea or coffee 1 cup with milk 2 tablespoons and sugar from ration<br>Biscuits 2 | Skimmed milk 1 cup or ordinary milk ½ cup or skimmed milk powder 2 table spoons<br>Biscuits 2 |

*Carbon dioxide narcosis*—Usually occurs in patients having a background of chronic pulmonary disease such as emphysema and precipitated by pulmonary infection, congestive failure or some drugs, etc. Associated manifestations such as tremor, myoclonic contractions, hyporeflexia, flaccid paralysis, convulsions and increased CSF pressure. Low shallow breathing and cyanosis. Diminished $O_2$ saturation and pH of blood. Finding of frog eyes consisting of oedema, suffusion and injected conjunctiva valuable clue.

*Carbon monoxide*—(i) History of exposure to poisoning with the gas. (ii) Headache, vertigo, muscular weakness, nausea, vomiting, drowsiness and coma. (iii) Intermittent convulsions. (iv) Cherry red colour. (v) Identification of carboxy hemoglobin

*Organophosphorous poisoning*—Dim vision, fixed miosis, diziness, severe headache, rapid difficult breathing, vomiting and increasing cyanosis. Severe poisoning is indicated by sphincter incontinence, muscular twitching, tonic convulsions, respiratory failure and pulmonary oedema. Pungent odour of breath.

**Intracranial Infections and Tumours:**

1. *Meningitis*—(i) Gradual onset. (ii) Signs of meningeal irritation (iii) Fever. (iv) C.S F changes.
2. *Brain tumor*—(i) Headache and vomiting. (ii) Visual disturbances. (iii) Neurological signs according to site of tumor. (iv) Progressive course. (v) Papilloedema.
3. *Cerebral abscess*—(i) Course usually more rapid than intracranial tumor. (ii) Evidence of infection like sinusitis, otitis media, lung abscess, etc. (iii) Fever. (iv) Leucocytosis (v) C.S.F.—increased cells
4. *Cerebral malaria*—(i) History of fever with rigors. (ii) Spleen may be enlarged. (iii) Fever common; may be hyperpyrexia.
5. *Encephalitis*—(i) Acute onset. (ii) Headache. (iii) Insomnia or drowsiness. (iv) Pupillary and ocular changes. (v) Involuntary movements. (vi) C.S F —Normal sugar suggestive.

**Post-epileptic coma:**

*Diagnostic features*—(1) History of characteristic seizures. (2) Scars on head from previous falls. (3) Tongue may be bitten. (4) Respiration slow. (5) Pupils fixed during convulsion. (6) Evidence of involuntary defaecation or micturition. (7) Recovery usually within an hour without paralytic sequelae, but status epilepticus may be followed by prolonged coma

2 Diabetics of normal weight stabilised on insulin dosage not more than 30 units per day who have never been ketotic.

*Contraindications*—

1. Juvenile diabetes
2. Patients with ketosis.
3. Obese adult-onset uncontrolled diabetics (Biguanide can be used).
4. Insulin taking diabetics.
5. Presence of renal, hepatic, or cardiorespiratory disease, or alcoholic abuse (because of increased risk of lactic acidosis).

*Adverse effects*—

1. Hypoglycemia—most frequently with glibenclamide, also chlorpropamide. Increase in hypoglycemic effect if concomitant use of sulphonamides, salicylates, phenylbutazone, monoamine oxidase inhibitors, beta-blockers, coumarins, and clofibrate.
2. Dyspepsia.
3. Skin rash including photosensitivity, rarely exfoliative dermatitis.
4. Facial flushing after ingestion of alcohol (mostly chlorpropamide).
5. Cholestatic jaundice (chlorpropamide).
6. Blood dyscrasias (rare).

*Effects enhanced by*—Sulphonamides, monoamine oxidase inhibitors, salicylates, anticoagulants, clofibrate, beta-blockers.

| *Drug* | *Duration of action and potency* | *Initial dose* | *Daily dose range* |
|---|---|---|---|
| *Sulphonylureas*· | | | |
| Tolbutamide | 6-12 hours<br>Least potent | 1 0-1.5 g | 1.0-3 0 g<br>(Usually divided doses) |
| Chlorpropamide | 24-42 hours<br>Strong | 100-250 mg | 100-600 mg<br>(Single dose) |
| Acetohexamide | 12-24 hours<br>Medium | 250-500 mg | 0 25-1 5 g<br>(Single or divided doses) |
| Tolazamide | 12-14 hours<br>Strong | 100-250 mg | 100 mg-1.0 g<br>(Single or divided doses) |
| Glymidine | 4-12 hours<br>Medium | 1.0-1 5 g | 0 5-2 0 g<br>(Single or divided doses) |

bath or covering the patient with ice water sheets and placing under a fan in heat stroke.

2. *Ensure proper respiration*—(i) Keep tongue forward. (ii) Oxygen inhalation. (iii) Respiratory stimulants like micoren or nikethamide. When there is deep coma, secretions and vomit if inhaled into the lungs, will soon result in death. The patient must be nursed in the semi-prone or lateral position with frequent changes from one side to the other.
3. *Ensure proper circulation*—(a) Parenteral fluids—glucose saline, plasma, or blood transfusion. (b) Vasopressor drugs like nor-adrenaline if low blood pressure or shock.
4. *Care of bowels and bladder*—(i) Indwelling catheter. (ii) Saline or soap enema.
5. *Care of skin*—(i) Frequent change of position in bed. (ii) Alcohol or spirit rub and powdering of skin. (iii) Care of mouth.
6. *Control of secondary infection*—with antibiotics especially in presence of fever or in apyrexial patients with the object of preventing pneumonia.
7. *Specific measures*—e.g. for barbiturate or organophosphorus poisoning, meningitis, diabetic coma, cerebral infarction, etc.

## 14. NEUROSYPHILIS

**Clinical manifestations:**

1. *Primary*—CSF lymphocytosis.
2. *Secondary*—Acute syphilitic meningitis.
3. *Tertiary*—
   (a) *Meningovascular*—(i) Cerebral or spinal endarteritis. (ii) Cerebral or spinal leptomeningitis. (iii) Meningomyelitis.
   (b) *Parenchymatous*—(i) General paresis. (ii) Tabes dorsalis. (iii) Primary optic atrophy
4. *Congenital.*

### I. Asymptomatic Neurosyphilis

(a) *Early form*—Less than 2 years after primary infection. CSF shows increased cells and protein. WR may be negative but CG curve is luetic or meningitic. Amenable to treatment.

hyperglycemia. (g) Pregnancy complicating diabetes (h) During surgery. (i) Patients with diabetes of 10-15 years duration in whom oral drugs in all combinations fail.

**Types of Insulin—**

1. *Unmodified soluble insulin—*

   *Indications* for use—(i) Insulin of choice in emergencies —acidosis, infection, trauma, surgery, etc. (ii) To supplement depot insulin effects when necessary. (iii) More practical for routine use in—(a) patients with insulin requirement of more than about 150 units daily, (b) patients unable to maintain uniform control with depot insulins.
2. *Modified insulins*—Protamine zinc insulin, globin insulin, isophane insulin and lente insulin, can be used as a single dose daily. Indications—(a) Elderly patients. (b) Patients with daily insulin requirement of less than 30 units. (c) Some diabetic children early in the course. (d) Refusal to take more than one injection a day
3. *Monocomponent insulins*—Highly purified insulins. Main indications for use are—(a) Local or general sensitivity to insulin. (b) Lipoatrophy. (c) Insulin resistance (insulin requirement of 100 units or more per day) in absence of any recognizable cause.

TYPES OF INSULIN PREPARATIONS:

| *Duration of action* | *Insulin preparation* |
|---|---|
| Short | Soluble insulin<br>Neutral insulin<br>Actrapid MC |
| Intermediate | Protamine zinc insulin (PZI)<br>Isophane insulin (NPH)<br>Globin zinc insulin<br>Insulin zinc suspension (amorphous)<br>Smilente<br>Semitard MC |
| Long | Insulin zinc suspension (crystalline)<br>Ultralente<br>Ultratard MC |

*Insulin therapy*—In general, optimal metabolic control is achieved by two short-acting injections (before breakfast and evening meal). If this gives a 'saw-tooth' pattern of blood

sias. Later symptoms due to extension to cord—Weakness of lower limbs with spastic paraplegia and sphincter disturbances develop between a few days to several weeks after onset of pains.

2. *Acute transverse myelitis* (Spinal vascular syphilis)—Spinal arterial thrombosis produces myelitis of sudden onset or with premonitory pains, if coexisting syphilitic meningeal involvement. The symptoms are those of complete or almost complete transection of the cord. If the lateral branch of the anterior spinal artery is thrombosed, there is weakness of segmental muscles and also hemianaesthesia on opposite side if the spinothalamic tract is damaged. In thrombosis of posterior spinal artery signs are confined to few segments. Postural and vibration sense are impaired if posterior columns involved.
3. *Cervical hypertrophic pachymeningitis*—(i) Pain in neck, radiating down the upper limbs and between the shoulders. (ii) Progressive weakness and atrophy of muscles supplied by the corresponding anterior roots. (iii) Finally progressive spastic paraplegia with sensory loss below the level of the lesion. CSF—Mild or moderate lymphocytic pleocytosis, protein content greatly elevated.
4. *Erb's spastic paraparesis*—Progression of paraparesis is very slow and there is little sensory loss.
5. *Spinal gumma*—Symptoms of rapidly growing spinal tumor.
6. *Syphilitic amyotrophy*—Closely resembles idiopathic progressive muscular atrophy or amyotrophic lateral sclerosis Sensory loss absent or minimal. Pain in the affected limb may occur at onset and is sometimes severe VDRL test positive. Anti-syphilitic treatment arrests progress of the disease.
7. *Radiculitis*—Syphilis usually affects the posterior roots which gives rise to pain of segmental distribution. If anterior roots are affected, there is weakness and wasting of the segmental muscles.
8. *Pseudotabes*—Onset 18 months to 5 years after primary infection. Presents with root pains, absent deep reflexes and bladder disturbances No AR pupils

## III. Parenchymatous Neurosyphilis

### General Paresis of the Insane (GPI)

CLINICAL FEATURES: Stages:

1. *Incipient stage*—Presenting symptoms are often vague as in dementing illness, consisting of ill-defined personality changes with irritability and forgetfullness, poor concentration, headaches and weight loss.
2. *Period of full development of psychosis*—Multiform psychic pictures—(a) Simple demented type—Most common are

## VI. Management of complications—

### A. Metabolic complications—

**Severe hyperglycemic ketoacidosis—**

Precipitating causes—(1) Acute infection viral or bacterial single most common cause. (2) Omission of insulin or inadequate dosage. (3) Vomiting. (4) Diarrhoea. (5) Prolonged neglect of diabetes. (6) Indiscretions in diet. (7) Surgical operations. (8) Trauma. (9) Myocardial infarction. (10) Pregnancy. (11) Thyrotoxicosis. (12) Resistance to insulin.

Pathophysiology—

1. *Ketoacidosis*—Lack of insulin, absolute or relative, causes increased release of fatty acids from adipose tissue and increased ketone body production from these acids. Ketone bodies are produced more rapidly than can be metabolised and therefore accumulate. Accumulation of ions causes fall in blood pH with characteristic hyperventilation, negative inotropic effect on heart and peripheral vasodilatation with consequent hypotension. Hydrogen ions also displace intracellular potassium which is then lost in the urine.
2. *Hyperglycemia*—and resultant glycosuria results in intracellular fluid loss, and a severe osmotic diuresis with dehydration, hypovolemia and associated loss of ions especially sodium chloride and potassium. Insulin normally drives potassium into cells, so potassium loss is accentuated by insulin deficiency.

Clinical features—

1 *Signs of ketoacidosis*—Characteristic odour of acetone in the breath, ketone bodies in urine, deep, rapid respiration, air hunger (developing when bicarbonate has fallen to ($<$ 10 mmol/1). Vomiting, abdominal pain and tenderness are often associated with severe ketoacidosis
2. *Due to fluid and electrolyte loss*—Nonspecific features of dehydration with tachycardia, inelasticity of skin folds and sunken eyes. In severe cases hypotension may develop but acute circulatory collapse is uncommon unless associated myocardial infarction or bacteriogenic shock. With increasing dehydration clouding of consciousness occurs and this may progress to frank coma.

The cardinal signs of severe diabetic ketoacidosis—severe dehydration, rapid breathing, and the smell of acetone—distinguish it from most other causes of coma.

9. *Gait*—(a) Wide-based, (b) eyes fixed to the ground, (c) legs lifted unduly in air, and (d) brought down with a stamp.
10. *Crisis*—Paroxysmal painful disorders of function of various viscera—Gastric crises, the commonest may cause epigastric or shoulder tip pain with or without vomiting or vomiting without pain.

*CSF*—Cells usually not above 100 c.mm., mononuclears, excess of globulin. Luetic type of gold curve.

DIAGNOSIS :

*Triad of symptoms*—Lightning pains, dysuria and ataxia.

*Triad of signs*—Argyll-Robertson pupils, absent tendon reflexes and positive Romberg's sign.

DIFFERENTIAL DIAGNOSIS :

1. *Meningeal and vascular syphilis of spinal cord*—Sometimes the posterior roots in the lumbar or sacral region may be involved with resultant loss of knee or ankle jerks. No lightning pains, pupils normal. Later spasticity, exaggerated reflexes and extensor plantar.
2. *Chronic polyneuritis*—pain, ataxia, absent tendon reflexes and Romberg's sign Absence of urinary incontinence and Argyll-Robertson pupils or girdle sensation. Pain of continuous and burning type, muscular weakness prominent.
3. *Friedreich's ataxia*—cerebellar type of ataxia. It differs from spinal ataxia in that the patient cannot stand steady even with eyes open whereas in spinal ataxia he falls only when eyes are closed (Romberg's sign). Normal pupils and atrophy of muscles.

| 4. *Subacute combined degeneration* | *Tabes dorsalis* |
|---|---|
| Mental changes | Mental changes unusual unless complicated by GPI |
| Pupils normal | AR pupils or irregular pupils with poor light reaction |
| Gross ataxia rare | Gross ataxia common |
| Evidence of peripheral nerve affection | No peripheral nerve affection |
| CSF normal | CSF: Lymphocytosis<br>WR positive |

B. *Observation*—Pulse, respiratory rate, B P. and temperature are recorded on admission and ½ hourly thereafter. An intake-output chart is maintained. Results of urine examination for sugar and acetone are charted serially.

C. *Treatment*—Principles are—(a) To detect and treat the underlying cause or causes (b) To correct the fluid and electrolyte imbalance. (c) To re-establish normal carbohydrate metabolism.

1. *Insulin*—Soluble insulin (or Actrapid) at rate of 6 units/hour by IV infusion. If insulin infusion cannot be properly controlled give IM—Loading dose of 20 units (0.25 U/kg) followed by 6 units (0 1 U/kg) hourly.

   Estimate blood glucose 2-hourly. If after 2 hours, it has not fallen by 25%, double the dose of infusion rate (or dose of IM insulin). Otherwise maintain same rate till blood glucose has dropped to 16 mmol/litre (about 300 mg/100 ml) when the infusion must be stopped. Now give soluble insulin subcutaneously 4 hourly according to sliding scale based on the amount of glycosuria

   | | | | |
   |---|---|---|---|
   | Urine sugar | 2% | 1% | <1% |
   | Soluble insulin | 32U | 16U | 8U |

   Twice-daily short-acting insulin should be resumed when patient can take his normal diet

2. *Fluid replacement and electrolytic therapy*—(i) *Saline* —2 litres of normal saline are given rapidly in 1 hour From 6-8 litres may be required in first 24 hours. In patients with impaired renal function there is risk of sodium and chloride overload and half strength saline may be preferred after first 2 litres It is advisable to warm the fluid to body temperature especially when it is given rapidly. In rare cases when severe hypotension persists for more than 2-3 hours, whole blood or dextran may be required

   CVP line is a useful guide to fluid therapy especially in elderly or in presence of cardiovascular disease.

   When blood glucose has fallen to 16 mmol/1 or less, give 5% dextrose about 1 litre/8 hours. Oral fluids can usually be started in 24 hours, and the normal diet resumed in 2 or 3 days.

3. *Alkalis*—In case of severe acidosis (arterial pH < 7.0) about 100 ml. 7.5% soda bicarb. should be given IV. Acidosis lessens with rehydration and insulin.

cycline 500 mg 6 hourly orally for three 15-day courses at monthly intervals.

Follow-up—CSF cell count should return to normal within 3 months, protein within 6 months. This response should be checked by repeat lumbar puncture at 6 weeks and 3 months after completion of therapy and thereafter at 6 monthly intervals until cells and proteins have been normal on two consecutive occasions. The IgG, Lange and serology often revert but may remain abnormal for long periods.

3. *Symptomatic treatment*—may be required for confusion, ataxia, urinary retention and Charcot's joints. For lightning pains—Carbamazepine upto 1600 mg daily or Phenytoin 300 mg daily. For gastric crises—Adrenaline 0 5 ml of 1/1000 solution subcutaneous.

## 15. TUBERCULOSIS OF THE CENTRAL NERVOUS SYSTEM

**Clinical manifestations:**

1. **Tuberculous meningitis**—See Chapter 10.
2. **Intracranial tuberculoma**—

*Clinical features*—(a) Age—Any but more common below 10 years. (b) Site—In pediatric age group it is common in posterior fossa, while in adults it is common supratentorially. (c) Symptoms and Signs—(i) Due to raised intracranial pressure—Headache, vomiting, papilloedema. (ii) Focal abnormality depending on site of lesion.

*Investigations*—(a) For site of lesion—Brain scan or for supratentorial lesions angiography more useful, while for posterior fossa tumors pneumoencephalogram or ventriculogram. (b) For evidence of tuberculous diathesis—ESR, X-ray chest, tuberculin test.

*Management*—Antituberculous therapy, measures to relieve intracranial tension, and surgical excision of tumor mass.

3. **Pott's paraplegia**—

*Pathogenesis*—Incidence of spinal tuberculosis is more than 50% of all bone and joint tuberculosis. It can occur at any age and sex incidence is equal. Spinal cord compression may be due to—(a) Fluid abscess in spinal canal. (b) Paraspinal abscess invading spinal canal. (c) Granulomatous tissue invading spinal

be minimised in such patients by constant infusion of heparin. (iv) *Cerebral oedema*—can occur during treatment. When recognised mannitol or possibly dexamethasone should be given but the outcome is often fatal.

(h) *Recovery from coma and prevention of recurrence*—Full chemical recovery from coma requires many days The reason for the coma episode should be carefully ascertained and corrective measures applied. Education of patient and his family.

**Hyperosmolar hyperglycemic non-ketotic coma—**

Generally occurs in elderly often in non-insulin dependent or new diabetic. Many cases are associated with high carbohydrate intake. Characteristic laboratory findings are blood glucose $> 900$ mg/100 ml and plasma urea $> 120$ mg/ 100 ml. *Treatment*—Isotonic saline if plasma sodium $< 159$ mEq/litre, otherwise 1/2 normal saline. Insulin as for severe ketoacidosis. Heparin should be used.

**Lactic acidosis—**

Rare cause of severe metabolic acidosis to be suspected in acidotic patients taking biguanides (especially phenformin). Blood glucose may be high, low or normal. *Treatment*—Large amounts of bicarbonates Hemodialysis or peritoneal dialysis may be necessary.

**Hypoglycemic coma** (See p. 459)

B. Diabetic retinopathy—(a) General measures—Avoidance of acts which tend to raise venous pressure in head and neck, e.g., straining at stool, squatting, lifting, etc. (b) Blood-lipid reducing agents such as Clofibrate. (c) Optimal control of diabetes, treatment of hypertension, giving up smoking. (d) Photocoagulation primarily in exudative retinopathy. (e) Pituitary ablation—indicated if useful vision in one eye without severe proliferative retinopathy and fibrosis, absence of significant complications such as cardiovascular or renal, psychologically sound patient. (f) Vitrectomy—in late cicatrial stages of the disease.

C. Renal disease—Reduction in insulin dosage. Biguanides should never be given. Vigorous treatment of hypertension. Diuretics. Low protein diet if uremic symptoms develop. Transplantation in selected cases with end-stage renal failure.

## 16. INTRACRANIAL TUMORS

**Classification:**

1. *Tumors of brain substance*—Gliomas.
2. *Tumors of meninges*—Meningioma, neurofibroma. (nerve-sheath)
3. *Blood vessel tumors*—Cavernous hemangioma, angioblastomas.
4. *Metastatic tumors*—Carcinoma, sarcoma, hypernephroma, melanoma, myeloma.
5. *Pituitary tumors*—Adenomas—chromophobic, eosinophilic and basophilic.
6. *Infective granulomas*—Tuberculoma, gumma.
7. *Parasitic cysts*—Cysticercus, echinococcus.

**Symptoms:** Intracranial tumors produce symptoms in three ways:

1. DUE TO INCREASED INTRACRANIAL PRESSURE—(a) *Headache*—tends to occur in early morning and is usually described as vice-like or gripping pain, aggravated by activities which increase intracranial pressure such as coughing and straining. (b) *Vomiting*—is sudden, projectile and not precede by nausea. (c) *Visual disturbance*—consists of progressive loss of visual activity usually with episodes of transient blindness in both eyes (visual obscurations) lastin only a few seconds but increasing in duration and frequenc with increasing intracranial pressure. (d) *Intellectual deterioration,* incontinence and disequilibrium if pressure i creases over long period. (e) *Drowsiness followed by co* if rapidly rising intracranial pressure.
2. BY IRRITATING THE CEREBRAL HEMISPHERES—produc epilepsy.
3. DUE TO INFILTRATION OF NORMAL STRUCTURES CAUSING LOSS FUNCTION—Progressive neurological deficits depend on location of the tumor:

MOTOR CORTEX—

(a) Irritation phenomena—Jacksonian fits, the extent pending on the extent of the tumor.

(b) Paralytic phenomena—Monoplegic weakness of the vulsed muscles, most marked immediately after a vulsion. Convulsions precede muscular weakne cortical tumors, weakness precedes convulsions in cortical tumors.

6. *Endocrine disorders*—Hyperthyroidism, hyperipituitarism, (acromegaly, bashophil adenoma), adrenal cortex tumor, pheochromocytoma.
7. *Increased intracranial pressure*—Brain tumors, fractures of the skull, intracranial hemorrhage and encephalitis are sometimes associated with periods of moderate hyperglycemia and glycosuria.
8. *Alimentary glycosuria*—due to increased rate of absorption of carbohydrate from the intestine, after partial gastrectomy.
9. *Infections and toxemias.*
10. *Severe exertion.*
11. *Nephritis and nephrosis*—due to degenerative changes in tubular epithelium.
12 *Chemical agents*—Poisoning by curare, carbon monoxide, caffein, morphine, strychnine Anaesthesia and asphyxia.

MELLITURIAS OTHER THAN GLYCOSURIA—

1. *Lactose*—in lactating women.
2 *Pentose*—due to ingestion of large amounts of prunes, plums, cherries and grapes, morphine addiction, inborn error of metabolism (essential pentosuria).
3. *Fructose*—(i) Severe cases of diabetes mellitus along with glucose. (ii) Alimentary fructosuria following ingestion of large quantities of fructose most often associated with impairment of liver function. (iii) As a metabolic defect (essential fructosuria).
4. *Galactose*—Congenital galactosemia.
5. *Mannoheptulose*—appears in urine of normal individual after eating large amounts of avocado.

**Diagnosis:**

1. History, hereditary background and physical findings.
2. Examination of urine and blood for sugar at random and one hour after a rich carbohydrate meal, if results not conclusive—
3. Glucose tolerance test—(See p. 445).
4. If persistent mellituria in spite of normal blood sugar, identification of type of sugar—
   (a) Test urine with glucose oxidase strips—Specific for glucose.

side, sensory impairment of cortical type and slight motor weakness.

CORPUS CALLOSUM—(i) Mental symptoms like those in frontal tumor. (ii) Bilateral pyramidal signs—double hemiplegia. (iii) Grasp reflex if tumor anteriorly placed. (iv) C.S.F.—yellowish with high protein content.

THALAMUS AND CORPUS STRIATUM—(i) Hemianaesthesia. (ii) Contralateral Parkinsonism or choreo-athetoid symptoms. (iii) Slowly progressive hemiplegia or hemiparesis may occur due to close proximity of internal capsule.

CORPORA QUADRIGEMINA—(i) Bilateral ptosis. (ii) Weakness of up-and-down movements of both eyes and feeble convergence. (iii) Pupils may be dilated and eccentric. (iv) Bilateral deafness may result.

MIDBRAIN—(i) Oculomotor paralysis on side of lesion with hemiplegia on opposite side. (ii) Pupils often unequal and dilated. Loss of reaction to light. (iii) Headache, vomiting and papilloedema conspicuous due to internal hydrocephalus. (iv) Signs of pyramidal tract involvement usually bilateral. (v) Sensory changes may occur. (vi) Tremor, ataxia, and nystagmus may occur due to involvement of cerebellar tracts.

PONS AND MEDULLA—(i) Signs of increased intracranial pressure slow to develop. (ii) Headache and vertigo common. (iii) Diplopia usually first focal symptom. (iv) Crossed paralysis—Weakness of jaw and facial muscles on one side, and soft palate, tongue and limbs on the other. (v) Sensory loss of trigeminal distribution. (vi) Rotated posture of head not uncommon—head flexed and rotated toward the side less affected by the tumor.

THIRD VENTRICLE—(i) Severe paroxysmal headaches with episodes of drop attacks. (ii) Papilloedema. (iii) Progressive dementia; sudden coma may occur. (iv) Neighbourhood symptoms—Somnolence, polyuria, glycosuria, obesity, sexual regression and irregular fever. (v) Pyramidal signs if extension to internal capsule.

CEREBELLUM—*Symptoms of cerebellar deficiency*—(i) Muscular hypotonia. (ii) Disturbances of posture—The shoulder on the affected side is often held at a lower level than the normal shoulder. (iii) Ataxia—In unilateral lesions, the patient tends to stagger towards the affected side. (iv) Ocular

pupils, and rapid, full-volume pulse. These symptoms predominate when blood sugar drops rapidly as in reactive hypoglycemia.

**Diagnosis:**

A. **Of hypoglycemic state—**

1. Suggestive history.
2. Dramatic response to IV glucose during attack.
3. Low blood glucose level during attack.

B. **Of the cause—**

1. *History and clinical features*—Most cases of hypoglycemia in adults other than insulinomas can be diagnosed clinically. Enzyme defects occur in childhood. Alcohol hypoglycemia only occurs after prolonged fasting. History of taking insulin or sulphonylureas in diabetics
2. *Diagnosis of insulinomas*—(a) During spontaneous episode—Low fasting plasma glucose level with very high fasting plasma insulin level. (b) After overnight fast—if normal overnight fasting plasma glucose level—(i) Fish insulin suppression test with human insulin assay, or (ii) insulin suppression test with C-peptide assay. (iii) Measurement of fasting plasma pro-insulin—It is high

   Localization—(a) Coeliac axis angiography—will locate most pancreatic tumors. Mesenteric artery angiography is required if tumor in uncinate lobe of head of pancreas. If not detected by angio—(b) Laparotomy or (c) Percutaneous transhepatic cannulation of portal vein for multiple blood sampling within the pancreas in portal, splenic and superior mesenteric veins. High localized plasma insulin concentrations indicate possibility of tumor. (d) Diazoxide—If patient is elderly and surgery undesirable, trial course of diazoxide will relieve symptoms in about 50% of patients
3. *Self administration of insulin*—(a) Insulin antibodies. (b) During spontaneous hypoglycemia low plasma C-peptide with high plasma insulin.
4. *Sarcoma*—Spontaneous hypoglycemia with low plasma insulin and no ketosis.

**Management:**

1. *Acute attack*—Administration of rapidly absorbable carbohydrate. In mild reaction, orange juice (100 ml.) or corn

**Investigations:**

1. *Plain radiographs of skull*—(a) Features of raised intracranial pressure—In adults erosion of pituitary fossa, especially the lamina dura, and occasionally "copper beating" of skull. In children skull sutures may be separated upto 10 years of age. (b) Displacement of calcified pineal gland by a large lesion in one hemisphere. (c) Calcification of the lesion in astrocytoma, oligodendroglioma and craniopharyngioma. (d) Bone reaction—e g. in meningioma. (e) Erosion of normal structures— e.g. acoustic neuroma widening the external auditory meatus.
2. *Isotope brain scanning*—will reveal about 80% of tumors.
3. *CT scanning*—will detect majority of tumors. Surrounding oedema and solid cyst contents can be clearly distinguished from solid tumor tissue.
4. *Ventriculography and encephalography*—Visualization of cerebral ventricles and subarachnoid space by injection of air. Ventriculography preferred whenever the optic discs are choked or other evidence of increased intracranial pressure.
5. *Cerebral angiography*—Tumors of the brain are localized by displacement of arteries and veins and by presence of abnormal vascular patterns. Of particular value in differential diagnosis of brain tumor from cerebral vascular lesions, aneurysm and angiomatous malformations.
6. *EEG*—is not a primary aid, but abnormalities consistent with hemisphere or deep central lesions, or with hydrocephalus, may be recognised.
7. *Lumbar puncture*—is of little practical value and in presence of raised intracranial pressure may be dangerous

**Differential Diagnosis:**

**A. Other conditions causing increased intracranial pressure:**

1. *Intracranial abscess*—Acute apoplectiform or subacute onset; presence of primary focus, leucocytosis, pleocytosis with markedly raised protein in C.S.F., fever. Choked disc very rare.
2. *Hydrocephalus*—(a) Congenital—Enlargement of head, slowly progressive wide anterior fontanelle, congestion of scalp veins, vomiting rare, mental deficiency. (b) Acquired —(i) Due to intracranial venous sinus thrombosis—papilloedema conspicuous, with little headache and vomiting. No focal signs. (ii) Due to meningitis—history of meningitis.

# 6. The Nervous System

## 1. LUMBAR PUNCTURE

**Indications:**

1. *Diagnostic*—(a) Examination of C.S.F. if—(i) signs of cerebral or meningeal irritation, (ii) unexplained coma, (iii) evidence of subarachnoid hemorrhage, (iv) acute and chronic infections of CNS. (b) Radiological diagnosis—To introduce air for encephalography and radio-opaque substance for myelography.
2. *Therapeutic*—(a) Raised intracranial tension in hypertensive encephalopathy. (b) Introduction of drugs such as antibiotics or corticosteroids into subarachnoid space.
3. *Anaesthesia*—introduction of anaesthetic drugs by thecal puncture for spinal anaesthesia.

**Contraindications:**

1. *General*—Markedly increased intracranial pressure as shown by papilloedema or drowsiness, because of the risk of herniation of brain substance through foramen magnum.
2. *Local*—Gross spinal lesion with obvious neurological damage because of danger of complete transverse lesion developing.

**Technique:** 1. *Position*—The patient is placed on his side at the edge of the bed with the knees drawn up and the head bent forward to get maximum flexion of the spine. 2. *Site*—The skin and fascia over the lumbar space selected are sterilised, (usually between the spines of the 3rd and 4th lumbar vertebrae, this space being a plane passing through the highest points of both iliac crests) and infiltrated with a small amount of 1% procaine. 3 *Puncture*—The lumbar puncture needle is inserted through the anaesthetised skin in the mid-line and passed forwards and slightly upward till it reaches the tough spinous ligament. This is pierced. A sudden "give" or cessation of resistance indicates that the needle has passed through the dura and entered the intrathecal space. The stylus is then removed and the fluid should flow out at once. It should be withdrawn slowly, if the tension is high

intracranial tumor. Decompression operation and division of meningeal adhesions cures symptoms and confirms diagnosis.

B. **Disorders causing progressive or recurrent symptoms:**

1. *Cerebral atheroma*—Carotid artery stenosis may present as a slowly progressive lesion, symptoms and signs developing over weeks or months. Progressive mental deterioration, hemiplegia and headache simulate cerebral neoplasm. Unilateral or bilateral papilloedema may be present. Carotid bruit often heard. Angiography and other investigations confirm diagnosis.
2. *Epilepsy*—Convulsions starting after age of 25 should suggest possibility of tumor. In doubtful cases investigations must be done to determine if epilepsy is due to tumor.

**Management:** Surgical removal easier with meningiomas and acoustic neuromas. For invasive growth or growth in difficult situation partial removal, decompression or radio-therapy.

## 17. DISORDERS OF THE SPINAL CORD

### PARAPLEGIA

DEFINITION—Paralysis confined to the lower limbs.

**Classification of causes:**

**I. Due to upper motor neurone lesion:**

A. INTRACRANIAL CAUSES: (a) Tumor of falx cerebri. (b) Thrombosis of superior sagittal sinus. (c) Cerebral diplegia. (d) Internal hydrocephalus. (e) Thrombosis of unpaired anterior cerebral artery.

B. SPINAL CAUSES:

(a) *Systemic degenerations of tracts*—Subacute combined degeneration, multiple sclerosis, amyotrophic lateral sclerosis, syringomyelia, Friedreich's ataxia.

(b) *Secondary affections of white matter*:

1. *Trauma*—Fracture dislocation, Kummel's disease.
2. *Infection*—Acute transverse myelitis, syphilis.
3. *Vascular*—(i) Hemorrhage—(a) Intrathecal (hematomyelia). (b) Intramedullary (spinal epidural hematoma). (ii) Thrombosis (myelomalacia).
4. *Compression*—Spinal tumor, spinal meningitis, cervical spondylosis, aortic aneurysm eroding vertebra, spinal caries, cranio-vertebral anomaly such as atlanto-axial dislocation, secondary deposits, Paget's disease, etc.
5. *Chronic malnutrition*—Pellagra.
6. *Toxins*—Lathyrism, fluorosis.

or the opening of the tentorium cerebelli. (5) *Injury to intervertebral disc.*

## 2. THE CEREBRO-SPINAL FLUID

**1. Physical characters:**

1. PRESSURE—Normal in horizontal position 60-150 mm. of water, in sitting position 200-250 mm. *Increased tension* —intracranial tumor or hemorrhage or intracranial sinus thrombosis, meningitis, meningism, hydrocephalus, benign intracranial hypertension, uremia and sometimes encephalitis. *Decreased tension*—subdural hematoma, spinal subarachnoid block or block in region of foramen magnum, repeated lumbar punctures.

2. APPEARANCE—(a) *Normal*—Clear and colourless.

(b) *Turbid*—in meningitis Fibrin clot "cobweb" usually in tuberculous meningitis. A pellicle may also develop in other forms of meningitis, poliomyelitis, intraspinal tumor, general paresis and epidemic encephalitis.

(c) *Bloodstained*—Intracerebral hemorrhage, subarachnoid hemorrhage, leakage of blood from cerebral tumor, hemorrhagic form of encephalitis, trauma of spinal cord, trauma of needle, hemorrhagic diathesis (including anti-coagulants, bleeding from angioma or from A-V malformation). If fluid is bloody, take it into three tubes. If it clears quickly, the blood came from trauma to a vein. If it is bloody throughout it suggests subarachnoid hemorrhage. The fluid should be centrifuged; if the supernatant fluid is xanthochromic it indicates subarachnoid bleeding.

(d) *Xanthochromia* (yellow tinting)—(i) Recent subarachnoid bleeding. (ii) Spinal block. (iii) Guillain-Barre syndrome. (iv) Acoustic neuroma. (v) Subdural haematoma. (vi) Purulent meningitis.

| | *Traumatic tap* | *Subarachnoid haemorrhage* |
|---|---|---|
| Xanthochromia | Absent | Present after centrifugation |
| Clotting | May occur | Absent |
| Blood staining | Varies from tube to tube | Usually uniform in all tubes |
| Pressure | Usually normal | Elevated |
| Repeat puncture at higher interspace | Often clear | Similar to initial tap |

C. IS THE PARAPLEGIA DUE TO LOCALISED OR SYSTEM DISEASE OF THE SPINAL CORD?—In localised disease signs and symptoms are referable to one or two segments of the cord. In system disease symptoms and signs are referable to various parts of the nervous system.

**Investigation of a case of Spastic paraplegia :**

I. **History—**

1. *Onset*—(a) *Acute*—Acute transverse myelitis, fracture dislocation of spine, prolapsed disc, haematomyelia, lathyrism. hysteria. (b) *Subacute*—Developing over two or three days—Acute myelitis, compression of spinal cord e.g. tuberculous spinal osteitis or pyogenic extradural abscess or rarely secondary carcinoma of spine. (c) *Insidious*—Meningomyelitis, subacute combined degeneration, cervical spondylosis, amyotrophic lateral sclerosis, spinal tumor, syringomyelia, multiple sclerosis, and sometimes lathyrism. General paralysis of insane, hereditary spastic paraplegia, and ischemic degeneration of spinal cord due to atherosclerosis. (d) *Unilateral*—onset in spinal tumor.
2. *Age*—(a) *Children*—Cerebral diplegia, hydrocephalus, meningitis, spina bifida, spinal caries and superior longitudinal sinus thrombosis. (b) *Adult*—Common are syphilitic meningomyelitis, T.B. spine, transverse myelitis, amyotrophic lateral sclerosis, syringomyelia, lathyrism and spinal tumor. (c) *Middle and old*—Cervical spondylosis, subacute combined degeneration, secondary deposits, Paget's disease, progressive cervical myelopathy.
3. *Family history*—(a) In lathyrism more than one member of family affected, and history of consumption of lathyrus pulse. (b) In subacute combined degeneration more than one member or family may have evidence of paraplegia, neuritis or pernicious anemia. (c) Familial incidence in familial spastic paraplegia.
4. *History of trauma*—Fracture dislocation of spine or hematomyelia.
5. *History of syphilis.*
6. *Symptoms*—
   (a) *Pain*—Constant or intermittent in extramedullary spinal tumor; may be aggravated by coughing or straining.
   (b) *Numbness and tingling*—Subacute combined degeneration, spinal tumors, disc protrusion, fluorosis.

thematous and post-vaccinal encephalomyelitis, and in multiple myeloma (ii) *Mid-zone or luetic*—precipitation in intermediate tubes—tabes, some cases of multiple sclerosis and meningo-vascular syphilis. (iii) *End-zone or meningitic*—Precipitation in lowest concentration in bacterial meningitis.

Immunoglobulin (IgG)—Normal content 15% of total proteins. Rises in demyelination and with neurosyphilis, primary lateral sclerosis, viral encephalitis, fungal meningitis, myelopathy due to vitamin $B_{12}$ deficiency, and subacute sclerosing encephalitis.

2. Chlorides—Normal 720 to 750 mgm. per cent. Diminished in purulent meningitis, and meningism, marked reduction in tuberculous meningitis. Also systemic disorders accompanied by hypochloremia.
3. Sugar—Normal 50-80 mgm. per 100 ml. *Reduced*—or absent in pyogenic meningitis, moderately decreased in tuberculous meningitis. *Raised*—slightly in encephalitis, diabetes mellitus, carcinomatosis of meninges. Normal in aseptic meningeal reaction, syphilitic meningitis.
4. Acetone—normally absent, its presence is of grave significance

III. **Cytological:**

Cell count—Normal 0-5 cells, lymphocytes. Between 10 and 100 per c.mm.—neurosyphilis, encephalitis, poliomyelitis, epilepsy, uremia. 100 to 500—tuberculous or syphilitic or aseptic meningitis, lymphocytic choriomeningitis and poliomyelitis. Over 500—purulent meningitis.

*Lymphocytosis*—(a) Meningitis—Tuberculous, viral, spirochetal, protozoan, ricketssial, carcinomatous, brucellar, chemical (e.g., after myelography), partially treated bacterial. (b) Parameningeal infections. (c) Poliomyelitis, herpes zoster. (d) Encephalitis. (e) Cerebral abscess. (f) Cerebral tumor. (g) Sinus thrombosis. (h) Following cerebrovascular accidents and subarachnoid hemorrhage. (i) Multiple sclerosis. (j) Post-traumatic. (k) Lead poisoning.

*Polymorphonuclear leucocytosis*—Pyogenic or fungal meningitis, acute syphilitic meningitis, early stage of poliomyelitis.

*Mixed*—cerebral abscess, early stage of poliomyelitis, syphilitic meningitis, infection of bones of skull in neighbourhood of meninges and many cases of tuberculous meningitis.

*Eosinophils*—pathognomonic of cerebral or spinal cysticercosis

*Plasma cells*—in neurosyphilis, also peculiar large iron-containing cells (Hortega cells).

*Malignant cells*—in malignant growth of brain or spinal cord.

(c) *Signs of posterior column affection*—Sensory ataxia, Romberg's sign, loss of vibration and position sense with normal tactile and pain sensations, in subacute combined degeneration and injury or compression of cord.

(d) *Only lateral column affection*—(i) Amyotrophic lateral sclerosis. (ii) Erb's spinal paralysis. (iii) Disseminated sclerosis. (iv) Anteriorly placed extradural compression, e.g., T.B. spine. (v) Sometimes subacute combined degeneration. (vi) Syringomyelia. (vii) Vascular lesions like thrombosis or hemorrhage in which sensory function has recovered. (viii) Lathyrism. (ix) Familial spastic paraplegia.

(e) *Postero-lateral columns affection*—Subacute combined degeneration, disseminated sclerosis, syringomyelia, compression myelitis, hematomyelia and myelomalacia, lathyrism, pellagra.

5. *Reflexes*—(a) *Absent knee and ankle jerks with extensor plantar*—(i) Subacute combined degeneration of the spinal cord. (ii) Taboparesis. (iii) Friedreich's ataxia. (b) *Inversion of the radial reflex*—long-standing cervical disc protrusion.

6. *Sphincters*—Spinal bladder results from damage to spinal cord by trauma, cord tumor or multiple sclerosis. Autonomous bladder in cauda equina lesions. Sensory bladder in subacute combined degeneration and multiple sclerosis.

7. *Trophic changes*—Syringomyelia.

8. *Gait*—(a) Ataxic in subacute combined degeneration and disseminated sclerosis. (b) Scissor gait in cerebral diplegia. (c) In lathyrism patient walks with staff, legs bent at knees and advancing limb strongly abducted and dragged forward with the toes reaching the ground first.

9. *Spine*—Deformity, tenderness and rigidity in T.B. spine. Kyphoscoliosis in syringomyelia and hereditary ataxias.

10. *Other findings*—(i) Other signs of syphilitic infection in spinal syphilis. (ii) Anemia and tenderness of calf muscles in subacute combined degeneration. (iii) Constitutional symptoms or evidence of tuberculosis elsewhere in the body in Pott's disease. (iv) In secondary deposits, symptoms due to primary disease, e.g., leukemia. (v) Symptoms of increased intracranial tension in intracranial tumor. (vi) Short neck with a low hair line and limitation of

IV. **Bacteria and parasites:**

1. Pyogenic organisms on smear and culture in purulent meningitis.
2. Tubercle bacilli in tuberculous meningitis (culture and guinea pig inoculation).
3. Leptospira in meningeal type of leptospira ictero hemorrhagica infection.
4. Flagellated trypanosomes in sleeping sickness more easily seen in C.S.F. than in blood.
5. Trichinella larvae in cerebral type of trichiniasis.
6. Echinococci, cysticerci, yeasts (torula), fungi and actinomycotic granules in infection of the nervous system with these organisms.

V. **Serological:** Positive CSF VDRL indicates active neurosyphilis especially in titres over 1 : 8.

## 3. DISORDERS OF SPEECH

**Classification:**

1. *Disturbances of speech which occur with diseases affecting higher nervous integrations*—Poverty of speech due to intellectual impairment—as in dementia or schizophrenia.
2. *Aphasia or dysphasia*—A cerebral disturbance in which there is loss, more or less exclusively, of the production and/or comprehension of spoken and/or written speech
3. *Dysarthria*—This is a pure motor disorder of muscular articulation, resulting in defective articulation, which may be due to flaccid or spastic paralysis, rigidity, repetetive spasms (stuttering) or ataxia.
4. *Aphonia or dysphonia*—Loss of voice due to disease of the larynx or its innervation. Articulation and internal language are unaffected.

### APHASIA

**Control of speech in the cerebral cortex**—Many sensory and motor activities are concerned in the four major language modalities—speech production, speech comprehension, reading and writing. The formulation of language is primarily a sensory function and demands the integration of auditory, visual and sensory events. It takes place in the cerebral hemisphere where predominant hand area (handedness) is situated and is called the dominant hemisphere. The left cerebral hemisphere is responsible for language function in more than 90% of normal right handed individuals and about 70% of normal left-handers.

7. *Therapeutic test*—If suspected cervical disc degeneration, restriction of neck movements by rest or by wearing a collar for few weeks will often produce marked improvement in walking.

**D. D. of Flaccid paraplegias—**

1. *Poliomyelitis*—(i) Acute onset with possibly signs of meningeal irritation. (ii) Muscular weakness and flaccid paralysis of scattered muscle groups. (iii) Not bilaterally symmetrical.
2. *Peripheral neuritis*—(i) Numbness and tingling at onset. (ii) Tenderness of calf muscles. (iii) Glove and stocking type of anaesthesia. (iv) Vasomotor and trophic changes —oedema, dryness, desquamation. (v) Bilaterally symmetrical paresis.
3. *Acute infective polyneuritis*—(i) Acute febrile onset. (ii) Rapid development of paralysis (iii) Bilateral facial palsy common. (iv) Severe involvement of proximal limb muscles.
4. *Cauda equina lesions* (Any lesion in spinal canal below D10 can cause cauda equina syndrome)—(a) Lateral cauda equina syndrome (e.g. neurofibroma)—Anterior thigh pain, weakness of quadriceps and absent knee jerk. In case of high lesion extensor plantar response. (b) Midline cauda lesion from within (Conus lesion)—(e.g. ependymoma, dermoid or lipoma)—Rectal and genital pain, micturition disturbances and impotence. Saddle anaesthesia. Symmetrical findings. (c) Midline lesion from outside (e.g. disc)—Signs of bilateral lumbar and sacral root involvement.
5. *Lumbar disc syndrome*—Paraplegia rare. (i) History of trauma may be obtained. (ii) Initial phase of pain in lumbar region. (iii) Radiation of pain to buttocks and back of thigh. (iv) Pain often aggravated by coughing. (v) Impairment of spinal movements. (vi) Impairment of sensation over dorsum of foot common.
6. *Tabes dorsalis*—(i) Lightning pains. (ii) Absent ankle and knee jerks. (iii) Pupillary changes. (iv) Positive Romberg's sign.
7. *Friedreich's ataxia*—(i) Heredo-familial. (ii) Age—usually young, 10-15 years. (iii) Cerebellar signs—Nystagmus, ataxic dysarthria or scanning speech, ataxia, and rhythmical oscillation of the head (titubation). (iv) Pyramidal

effortless and fluent but with frequent paraphrasias (inappropriate words or words with inappropriate syllables) and neologisms (non-existent words).

3. Conduction aphasia—usually results from a parietal lobe lesion between Broca's and Wernicke's areas. Speech is fluent and paraphasic.

4. Global aphasia—is the commonest variety of aphasia and occurs with large peri-Sylvian lesions. The expressive disturbance characteristic of Broca's aphasia is combined with loss of comprehension of equal severity. Speech is non-fluent. This may persist after large cerebral infarcts. With less extensive lesions there may be some recovery towards one of the former categories, usually because comprehension improves.

## DYSARTHRIA

**Peripheral neuromuscular control of speech**—There are two essential processes for the conversion of the thought conceived in the cerebral cortex into the spoken word, by means of the voluntary musculature—(a) phonation or the production of sound and (b) articulation.

**Causes of dysarthria:**

1 *Cerebral involvement*—(a) Bilateral pyramidal lesion—e.g pseudobulbar palsy, motor neurone disease, upper brainstem tumors. Speech slurred, some disturbance of swallowing, jaw jerk exaggerated. (b) Rarely with unilateral lesion especially in thalamus.

2. *Extrapyramidal lesion*—(a) Parkinsonism—(i) Speech slow, laboured, intermittent and jerky—monotonous or festinate speech. (ii) Speech may be hesitant with sudden outpouring of rapid speech (explosive speech). (b) Athetosis—Speech slow and difficult because of slowness of movements of lips and tongue.

3. *Cerebellar disease*—Two types of dysarthria—(a) Defect in articulation itself in the form of slurring of consonants and (b) disorder of rhythm of speech, i.e., disturbance of normal co-ordination between speech and respiratory movements.

4. *Lower motor neurone lesions*—(a) *Facial paralysis*—causes difficulty with labials resulting in slurred speech. (b) *Tongue paralysis*—Gutteral speech. (c) *Palatal paralysis*—Nasal speech.

below the level of the lesion. (iii) Compression of spinothalamic tract leads to an impairment of pain, heat and cold on opposite side of the body, though the appreciation of these is seldom affected to an equal extent. The upper margin of analgesia and thermoanaesthesia tends to be slightly higher than that of loss of touch.

2. *Nerve root symptoms*—
   (a) *Symptoms of posterior root irritation*—(i) Pain and hyperalgesia corresponding to the segments compressed. (ii) Various types of sensory loss, with an upper level somewhat below the segmental level of the site of compression.
   (b) *Symptoms of anterior nerve irritation*—rare. Muscular atrophy of root distribution valuable focal sign.
3. *Sphincters*—In late stages precipitate or difficult micturition followed by retention.
4. *Symptoms due to affection of vertebrae*—may be present —(i) Local pain and tenderness. (ii) Rigidity of back. (iii) Deformity.

**Localization of segmental level:**

1. *Pyramidal system*—(a) Spasticity of all four limbs—lesion above $C_4$ cord segment. (b) Spasticity of lower limbs plus flaccid weakness of scattered muscles of upper limbs—lesion of cervical enlargement ($C_5$-$T_2$). (c) Spasticity of lower limbs alone—lesions of thoracic cord ($T_2$-$L_1$). (d) Irregular spasticity of lower limbs plus flaccid weakness of scattered muscles of lower limbs—lesion of lumbosacral enlargement ($L_2$-$S_2$).
2. *Sensory symptoms*—Hyperaesthesia and hyperalgesia at level of lesion, analgesia and thermoanaesthesia below. Radicular pain offers a clue to specific dermatome localization early in the disease process. To localise the exact vertebral level corresponding to the spinal compression, for the cervical vertebrae add 1, for dorsal 1-6 add 2 and for dorsal 7-9 add 3. The 12th dorsal arch overlies lumbar 5.

The testing of vibration sense is valuable in ascertaining the level of a lesion which affects the posterior columns. The tuning fork is applied to the bony prominences from below upwards until the level is determined at which it is felt.

*Symmetrical bilateral central scotomas*—(a) Toxic causes—tobacco or alcohol amblyopia, quinine, certain phenothiazine drugs. (b) Nutritional.

*Asymmetrical bilateral scotomas*—Demyelination. Concentric constriction (Papilloedema associated with enlargement of blind spot)—(a) Glaucoma. (b) Papilloedema. (c) Chronic syphilitic optic neuritis.

2 LESIONS OF CHIASMA—Bilateral hemianopia of upper or lower quadrant depending on whether pressure is from above or below the chiasma. Later involvement of nasal field of eye first affected, followed by loss of remaining field. Causes—Pressure due to tumor in region of pituitary fossa, intracranial aneurysm or distended third ventricle.

3. LESIONS OF OPTIC TRACT—Symmetrical visual defects—Crossed homonymous field defect slightly greater on side of lesion Causes—Parenchymatous lesions of parietal, temporal or occipital lobes (vascular accidents, injuries, tumors).

**III, IV and VI cranial nerves—**

OCULOMOTOR—Paralysis causes—1. Diplopia. 2. External paralytic squint (divergent squint). 3. Inability to move eye upwards, directly downwards or directly inwards. 4. Ptosis due to paralysis of levator palpebrare. 5. Pupil dilated and not reacting to light or accommodation

TROCHLEAR—1. Diplopia on looking in direction of action of superior oblique, i.e., downwards and inwards. 2. Head inclined forwards and towards shoulder on sound side to avoid giddiness when looking downwards

ABDUCENT—1. Diplopia on looking outwards. 2. Convergent squint 3. Paralysis of external rectus with inability to turn the eye outwards beyond midpoint (Internal paralytic squint). 4 Head turned towards affected side.

*Causes*—

1. *Within brain stem* (Nuclear and fascicular lesions)—Neoplasms, vascular lesions, increased intracranial tension, encephalitis, syringobulbia, tuberculoma.

| *Cord segment* | *Clinical features* | *Muscles paralysed* | *Reflexes* |
|---|---|---|---|
| D 6 | Spastic paralysis of muscles of abdomen and lower limbs. | Intercostals, upper and lower rectus abdominals, oblique abdominals | Epigastric (C6-8) lost |
| D 9-10 | Spastic paraplegia. | Lower halves of rectus abdominis | Upper abdominals present. Lower abdominals lost. |
| D 12-L 1 | Spastic paraplegia. | Lower fibres of oblique abdominis, and transversalis Ileopsoas | Abdominals present Cremasteric (L1-2) lost. |
| S 3-4 | Spastic paraplegia. | Quadriceps, adductors of hip. | Knee jerks (L2-4) lost. Ankle jerks (S1-2) ++. |
| S 1-2 | Flexion of hip, adduction of thigh, extension of knee and dorsiflexion of foot possible, all other movements in the lower extremities weak. | Guleti, calf muscles, anterior tibial, and peroneal, small muscles of foot | Knee jerks present. Ankle jerks lost Plantar reflexes lost |
| S 3-4 | No paraplegia. Retention of urine and faeces. | Paralysis of external sphincter. | Anal and bulbocavernous reflexes lost Deep reflexes normal. |
| Cauda-equina | (i) *Whole cauda*—Anaesthesia below the folds of the groins including genitals. Loss of control of bladder and rectum. | Paralysis of lower limbs | Absent deep reflexes |
| | (ii) *Upper sacral and L5*—Sensory loss over front and posterior and outer aspect of thigh. | Paralysis of glutei, hamstrings, and all muscles below the knees | Knee jerks present, Ankle jerks lost. |
| | (iii) *Below S2*—Saddle shaped area of anaesthesia Incontinence of urine and faeces | No paralysis of lower limbs | All reflexes in lower limbs normal |
| | (iv) *S4-5 and coccygeal roots*—Anaesthesia of anus and rectum. | Paralysis of levator ani. | |

## VII. **Facial nerve:**

GENERAL CHARACTERISTICS—Type of facial palsy:

| Upper motor neurone | Lower motor neurone |
|---|---|
| 1. Affects mainly muscles of lower part of face. Never complete. | Whole face affected, complete palsy. |
| 2. Seldom isolated palsy. | Isolated paralysis. |
| 3. Emotional movement preserved. | Loss of emotional movement. |
| 4. No muscle contracture. | Marked muscle contracture may occur. |
| 5. No reaction of degeneration. | Reaction of degeneration present. |
| 6 EMG and nerve conduction normal. | Evidence of lower motor neurone lesion on EMG. |

SPECIAL CHARACTERISTICS—

**Supranuclear—**

1. *Corticospinal lesion—*

Causes—Tumor, abscess, hemorrhage or thrombosis.

Signs—(a) Lesions in region of cerebrum, cerebral peduncles and upper pons—Facial palsy associated with paralysis of ipsilateral limbs. (b) Lesions in region of lower pons, prenuclear lesions—Facial palsy with crossed paralysis of limbs.

2. *Mimic paralysis*—Weakness or abolition of emotional movements of face with retention of voluntary movements due to lesions of anterior part of frontal lobe or lesions in neighbourhood of optic thalamus.

**Nuclear and infranuclear lesions—**

| *Site of lesion* | *Possible causes* | *Associated features* |
|---|---|---|
| PONS (Fig 6 3-1) | Vascular lesions or tumour of brain stem. Multiple sclerosis. Polioencephalitis. | 5th n. involvement — sensory loss on opposite side and often paralysis of ipsilateral jaw ms or 6th n. involvement — conjugate ocular deviation to same side. Long-tract signs — hemiplegia or hemianaesthesia. |
| CEREBELLOPONTINE ANGLE (Fig 6 3-2) | Tumour in cerebellopontine angle e g. acoustic neuroma. Meningioma. | Nerve deafness, tinnitus, vertigo, cerebellar signs, loss of corneal reflex. CSF changes |

## ACUTE TRANSVERSE MYELITIS

**Definition:** The term myelitis is used to denote a large number of conditions, the only common feature of which is the presence of severe local interference in the function of the spinal cord.

**Causes:**

1. Trauma—Fracture dislocation of spine.
2. Acute transverse myelitis of unknown etiology.
3. Specific infections—Syphilis, measles, post-vaccinal, mumps, typhoid.
4. Vascular lesions—Hematomyelia, hematorrhachis, thrombosis.
5. Compression—Spinal caries (tuberculous myelitis).
6. Demyelinating diseases—Acute disseminated encephalomyelitis, multiple sclerosis, neuromyelitis optica.
7. Acute suppurative myelitis—as complication of purulent meningitis, osteomyelitis of adjacent vertebra, bacterial endocarditis, bronchiectasis.
8. Toxic—Arsenic, sulphonamides, carbon monoxide, after spinal anaesthesia.
9. Virus diseases—Anterior poliomyelitis, herpes zoster, lymphocytic choriomeningitis
10. Allergic—As part of acute encephalomyelitis
11. Caisson's disease.

**Clinical features:**

Onset rapid or subacute. Initial symptoms may be—(i) Motor—weakness, and stiffness in legs. (ii) Sensory—numbness, tingling or aching. (iii) Girdle constriction at level of lesion. (iv) Constitutional symptoms—Fever may occur.

1. *Cervical myelitis*—
   - (a) *Motor symptoms*—Paralysis of upper and lower extremities, if high cervical death in few days.
   - (b) *Sensory*—Hyperaesthesia and root pains in the segmental areas with diminished sensations below.
   - (c) *Reflexes*—All reflexes usually lost at onset. Later tendon reflexes return in lower extremities and plantars become extensor. In complete recovery, the abdominal and cremasteric reflexes are usually lost to resume normal activity later.
   - (d) *Sphincters*—Retention of urine and faeces. After about a fortnight, automatic bladder. Sphincter function usually returns early. Priapism often present.
   - (e) *Trophic changes*—Likely to occur. Oedema and bedsores. Cystitis.

(d) *Causes*—(1) Exposure to cold; oedema and subsequent compression of nerve trunk within the rigid Fallopian canal causes circulatory disturbance. (2) Other important causes of acute facial palsy include supurative otitis media, herpes zoster, head injury, Guillain-Barre syndrome, sarcoidosis and multiple sclerosis.

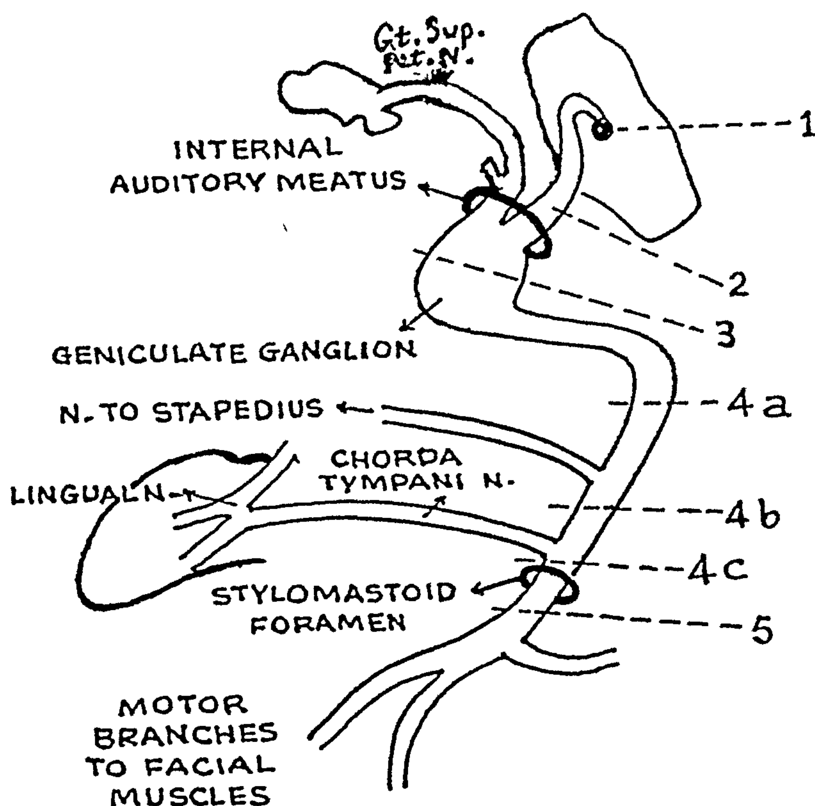



Fig 63 Diagram of components of the facial nerve.

SYMPTOMS: Sudden following exposure to chill or without any apparent precipitating cause, maximum paralysis in 24 hours. Postauricular pain is common and may precede paralysis by 2 days. There may be spontaneous complaints of loss of sense of taste, hyperacusis and watering of the eye. Sweating less on affected side.

SIGNS:

1. Forehead cannot be wrinkled; frowning lost (Frontalis).
2. Eye cannot be closed (orbicularis oculi, sphincter of palpebral fissure). On attempting closure, eyeball turns upwards and outwards (Bell's phenomena).
3. On showing the teeth, the lips do not separate on affected side. Whistling not possible. Articulation of labial com-

3. *Care of the bowels*—If incontinence, keep parts perfectly clean; cotton or wool may be packed round frequently. For constipation, daily enema and liquid paraffin.
4. *Chemotherapy*—Antibiotics for control of secondary infection.

II. AFTER ACUTE STAGE—

1. *Diet*—High protein with vitamins, but less milk and less calcium.
2. *Specific treatment*—Penicillin for syphilitic myelitis; laminectomy for spinal tumor; immobilisation of spine in Pott's disease, vitamin $B_{12}$ for subacute combined degeneration, etc.
3. *Physiotherapy*—Massage and passive movements. Early attempt at active movements. Patient allowed to sit up in wheel chair as soon as possible. In spastic paraplegia caused by progressive spinal cord disease every effort should be made to keep the patient on his feet for sometime every day. To prevent flexion contractures, one of the methods is to make the patient lie face down over a firm mattress with the toes over the end of the mattress, for ½ to 1 hour at a time three or four times a day. If necessary a weight of a few pounds may be suspended from the heels to control spasms. When the arms are reasonably strong, walking may be attempted, at first with parallel bars, and later with elbow crutches.
4. *Psychotherapy*—to help patient to adjust himself to new mode of life.
5. *Phenol in glycerin*—injection by intrathecal or extradural route for intractable pain and to relieve spasms in persons with irremediable paraplegia.

## MULTIPLE SCLEROSIS

**Definition**—A chronic disease principally affecting young adults, characterised pathologically by the presence of numerous areas of demyelination in the central nervous system, and clinically by neurological symptoms and signs which have a tendency toward remission and exacerbation.

*Pathogenesis*—Cause of MS remains unknown. Theories are —There is a genetic susceptibility, perhaps expressed as an abnormality of lipid metabolism or defect in immune mechanisms. At some point in childhood an environmental influence, perhaps a virus infection (such as measles), initiates the disease

7. *Treatment of sequelae*—(a) Residual severe weakness—plastic surgery. (b) Faulty reinnervation resulting tears pouring from affected side on chewing (syndrome of crocodile tears)—curring of tympanic nerve which normally conveys the glossopharyngeal salivary fibres.

VIII. **Auditory nerve:**

COCHLEAR BRANCH—1. Tinnitus. 2. Nerve deafness. Causes—(a) *At cochlear level*—Otosclerosis, Meniere's syndrome, drugs such as salicylates, streptomycin, quinine, prolonged exposure to noise (b) *In nerve trunk*—Old age, inflammatory or toxic lesions, cerebello-pontine angle tumours. (c) *In brain stem*—Pontine vascular lesions, severe demyelination, rarely tumours.

VESTIBULAR BRANCH—1. Vertigo. 2. Nystagmus. 3. General symptoms such as sweating, nausea, vomiting.

IX **Glossopharyngeal nerve:** Loss of taste on posterior one third of tongue. Isolated lesions do not occur. Causes—See below.

X. **Vagus nerve:**

1. *Paralysis of palate*—Unilateral paralysis: No symptoms. Positive 'Ah' test (b) Bilateral paralysis—Nasal regurgitation, nasal twang, no elevation of palate on phonation.
2. *Paralysis of larynx*—(a) Unilateral total paralysis—Affected vocal cord in cadaveric position. Unilateral anaesthesia of larynx if lesion above origin of superior laryngeal nerve (b) Unilateral abductor paralysis or bilateral total paralysis if recurrent laryngeal nerve involvement No laryngeal anaesthesia.
3. *Bilateral abductor paralysis*—causing inspiratory stridor.
4. *Bilateral total paralysis*—loss of voice; no stridor.

Causes—(a) Nuclear lesions—Syringobulbia, posterior inferior cerebellar artery thrombosis, encephalitis, progressive bulbar paralysis, Guillain-Barre syndrome, diphtheria (b) Posterior fossa—Tumours, meningo-vascular syphilis, extension of infection from middle ear (c) Trunk—Penetrating wounds and tumours. (d) Recurrent laryngeal nerve—Aortic aneurysm, enlarged left atrium, mediastinal mass or glands, enlarged thyroid, carcinoma of oesophagus.

XI. **Accessory nerve:**

SPINAL ACCESSORY NERVE—Same as nuclear lesions of vagus—paralysis of palate, pharynx and larynx.

3. *Cerebral form*—Transient psychotic episodes and emotional disturbances. Hemiplegia, dysphasia, visual field defects and rarely convulsive seizures may usher in the disease.

CRITERIA FOR DIAGNOSIS: of multiple sclerosis—

1. Age of onset 10-50 years.
2. Lesions dissociated in time and place.
3. Predominantly white-matter affection.
4. Interval between episodes about one month or chronic progressive over 6 months (especially in older people).
5. Disease lasting for more than a year.
6. All other causes have been ruled out.

**Treatment:**

1. *Specific treatment*—

   (a) *ACTH*—to shorten duration of acute relapse. 40 units ACTH gel b.d. for one week reducing the dose over next 2 weeks. (b) *Cytotoxic agents*—Short course of cyclophosphamide or continuous administration of Azathioprine may prevent relapses. (c) *Transfer factor*—to reduce possible defective immune mechanisms. (d) *Polyunsaturated fatty acids*—may produce reduction in severity and length of relapses.

2. *Symptomatic treatment*—Analgesics for pain. Muscle relaxants for spasticity. Care of bowel and bladder dysfunction. Physiotherapy.

## CRANIO-VERTEBRAL ANOMALIES

### Congenital atlanto-axial dislocation

**Clinical features:**

1. *Cervical pain and stiffness.* Often limitation of neck movements.
2. *Neurological manifestations*—of cervical myelopathy. Evidence of pyramidal tract affection in all four limbs with exaggerated deep reflexes and extensor plantar. Paraesthesia either confined to upper limbs or involving all four limbs.
3. *Transitory attacks*—of paralysis of upper cervical cord or lower most part of medulla with paralysis of limbs, paraesthesia, unconsciousness. Rarely blurring of vision or blindness. Attacks precipitated by exaggerated flexion or extension of the neck.

mechanism that insulates neurones from each other The disorder usually begins in the distribution of the lower divisions, the ophthalmic division is less commonly affected.

*Exciting causes*—Spontaneous, or following exposure to cold wind, blow on face, or chewing, or eating, or drinking hot or cold fluid or talking, or washing the face.

**Symptoms:**

**During the attack—**

1. *Pain*—(a) Site—Unilateral, more commonly confined to one of the three divisions of the nerve. Common points of origin are just external to ala nasi, infra-orbital foramen or mental foramen below the canine tooth. Pain sometimes confined to one branch of a division. Tendency for pain to commence locally and subsequently spread in each attack, thus invading a larger area. (b) Character—sharp and paroxysmal, sudden in onset and cessation. Short lightning flashes of pain or "red hot needles". (c) Duration—only a few seconds Rarely half a minute or longer due to series of short sharp stabs of pain, interrupted by brief intervals.
2. *Associated symptoms*—(i) During the attacks, the face is often thrown into a strong involuntary tonic spasm on the affected side. (ii) Flushing of face. (iii) Dilatation of pupil. (iv) Excessive lacrimation and (v) sometimes secretion of nasal mucus and saliva may occur on the side of pain.

**In between the attacks—**

1. *Trigger zones*—Certain localised hyperaesthetic spots on face, gums or tongue, a slight stimulus of which sets off an attack.
2. *Dull continuous pain*—follows paroxysmal pains if severe. Usually of a boring character. Skin over affected region is sore and tender after a paroxysm
3. *Sensory changes*—none except for hyperaesthesia
4. *Skin and hair*—After repeated attacks skin becomes shiny and hair in the area may become gray or rubbed away.
5. *Loss of weight and depression*—due to interference with food intake and recurrence of pain over a prolonged period.

**Differential Diagnosis:**

1. *Symptomatic trigeminal neuralgia*—(a) Neuralgia indistinguishable from the idiopathic variety may occur as a result

3. *Korsakoff's psychosis*—Wernicke's encephalopathy is usually associated with acute onset memory deficit (due to damage to hippocampal and mammilary body complex). The brain stem symptoms nystagmus, extraocular nerve palsies and dysarthria usually respond to vitamin therapy, but a permanent memory defect occurs.

**Nicotinic acid deficiency**—Mental confusion, sometimes fits, peripheral neuritic or spinal cord lesions occasional.

**Pyridoxine deficiency**—1. *Chronic convulsions*—in infancy may be due to lack of pyridoxine. 2. *Polyneuropathy*—as a complication of isoniazid treatment of tuberculosis arises from blocking of pyridoxine by the drug.

**Pantothenic acid deficiency**—*Burning feet syndrome*—Intense discomfort in feet in absence of objective sensory alteration or of motor, or tendon reflex signs.

There are two lines of evidence for this—(i) Its reproduction in human volunteers by giving them omega-methyl-pantothenic acid, an analogue of the vitamin which acts as an antagonist. (ii) Nitrofurazone, a drug used in treating trypanosomiasis, causes an acute burning feet syndrome which responds promptly to parenternal calcium pantothenate.

**Vitamin $B_{12}$ (Cyanocobalamin) deficiency**—

**Types of disorders**—

(a) CEREBRAL TYPE—The symptoms cover a wide range and consist of mild disorders of mood, mental slowness, memory defect which may be severe, confusion which may be persistent or relapsing delusions and paranoid behaviour and sometimes violent mania, visual and auditory hallucinations, and faecal and urinary incontinence in the absence of overt spinal lesions. Epilepsy and dysphasia may occur. These cerebral symptoms depend on demyelinating lesion of the white matter in the brain of the same nature as occur in the posterolateral column of the spinal cord and peripheral nerves. Optic atrophy or its precursor retrobulbar neuritis is not an uncommon accompaniment and may be the first manifestation. It occurs predominantly in males.

(b) PERIPHERAL NEURITIS.

(c) SUBACUTE COMBINED DEGENERATION.

*Etiology*—(i) Age—40-60. (ii) Both sexes. (iii) Familial incidence known. (iv) Associated conditions—usually pernicious anemia. Rarely as a result of carcinoma stomach, gastrectomy and gastro-enterostomy, steatorrhoea or malnutrition from protein deficiency.

**Management:**

I. MEDICAL—

1. *Elimination of all possible sources of infection.*

2. *Drugs*—

(a) *Analgesics*—Potent analgesics must be used with caution because of danger of habituation.

(b) *Carbamazepine* (Tegretol)—Effective in relieving symptoms in majority of patients within 24 hours. Initial dose 100 mg. t.d.s. gradually increased to 200 mg. q.d.s. or more. Side effects—dizziness and drowsiness common. Drowsiness, dryness of mouth, nausea and vomiting and erythematous rashes may occur but disappear within 48 hours after stopping treatment. Rarely depression of bone marrow.

(c) *Phenytoin sodium*—0 1 gm. t.d.s. when carbamazepine cannot be tolerated.

(d) *Vitamin $B_{12}$*—1,000 micrograms I.M. daily for 2 weeks or more with vitamin $B_1$—50-100 mg. daily.

(e) *Gower's mixture*—Potassium bromide 0.6 gm., Tinct of gelsemium 10 ml., Phenazone 0.5 gm., Aqua ad 15 ml, t.d.s.

II. INJECTION OF ALCOHOL—Injection of the affected nerve, or of the Gasserian ganglion, if more than one division is affected. Inject about 10 minims of 90% alcohol after local anaesthesia with 2-3 drops 2% procaine. Relief seldom lasts more than 6 months. Undesirable effects—neuropathic keratitis, paresis of muscles of mastication lasting a few months, numbness or deadness in the skin of the face. Useful in those in whom on account of age or for some other reason surgery is contraindicated

III. SURGICAL TREATMENT—Selective or complete pre-ganglionic section of the trigeminal root. Indications—(i) Failure of repeated injections to give relief. (ii) Patient going abroad. (iii) To avoid necessity for repeated injections. Permanent relief from pain but disadvantages are permanent dysaesthesiae in most cases. A better technique is percutaneous electrocoagulation of the preganglionic rootlets corresponding to the trigger zone, the temperature of the probe being so regulated as to coagulate the small thinly myelinated pain fibres but preserving the more heavily myelinated touch fibres.

(d) Drugs—Reserpine, phenothiazines, butyrophenones such as haloperidol.
(e) Cerebral arteriosclerosis.
(f) Neurosyphilis.
(g) Tumors of brain rarely.

**Clinical Features:** Triad of tremors, rigidity and akinesia.

1. *Expression*—Mask-like expression, staring eyes, infrequent blinking; mouth slightly open with dribbling saliva. Speech slow and monotonous.
2. *Disorders of movement*—Poverty of movements, slowness of mastication, deglutition and ocular movements. Speech slow and monotonous; diminution of synergic movements; emotional movements slow and protracted. Disturbance in handwriting may be earliest disturbance. Decrease in range of armswing particularly when the involvement is unilateral is an early sign.
3. *Rigidity*—Plastic or lead pipe, i.e. present to equal extent in opposing muscle groups and if a limb is passively moved the rigidity gives way with a series of slight jerks, or 'cog wheel' type if combined with tremor.
4. *Posture and Gait*—Usually patient is slightly stooped, walks with quick, shuffling steps as if constantly about to fall forward while chasing his own centre of gravity (festinant gait). Typically there is deficiency of associated movements, swinging of the arms in particular is greatly impaired.
5. *Tremors*—may be first symptom; usually starts in one upper limb; characteristically tremor at rest and described as 'pill rolling'. Head may be involved. Tremors disappear during sleep.
6. *Reflexes*—sluggish due to rigidity. Plantars flexor.
7. *Autonomic symptoms*—Excessive salivation, face greasy; cold tolerated better than heat.
8. *Glabella tap test*—When the glabella or nasion is tapped quickly, normally there is blinking of both eyes for 2 to 3 taps, then there will be no response due to the subject's adaptation. In Parkinsonism the patient may be unable to suppress the reflex blinking.
9. *Associated disorders*—In cerebral arteriosclerosis and chronic manganese poisoning associated supranuclear bulbar palsy with uncontrollable attacks of laughter or crying.

pigment or actual atrophy. (vii) Failure of pupils to dilate to painful stimuli.

*Causes*—(i) G.P.I (ii) Tabes dorsalis. (iii) Brain stem encephalitis. (iv) Multiple sclerosis (v) Cerebral tumor in region of third ventricle, aqueduct of Sylvius or corpora quadrigemina. (vi) Syringomyelia. (vii) Chronic alcoholism. (viii) Diabetes (ix) Brain stem encephalitis.

8. *Paralysis of accommodation*—(i) Selective impairment in lesions of third nerve or ciliary ganglion or diphtheria, (ii) Impairment or loss with weakness of convergence may occur in encephalitic Parkinsonism (iii) Brain stem lesions such as tumors or encephalitis.
9. *Absent light reflex*—Optic atrophy, third nerve lesions, myotonic pupil, AR pupil, glaucoma, iritis, cataract
10. *Wernicke's pupil reaction*—Absence of pupillary contraction when a ray of light is thrown on the blind side of the retina, whilst illumination of the seeing half of each retina still evokes a normal light reflex. It signifies a lesion in the visual path in the optic tract.
11. *Holmes Adie pupil (myotonic pupil)*—Unilateral dilated pupil, reacts promptly to mydriatics and miotics, but very slowly to light and accommodation, the larger pupil becoming smaller than its fellow. Characteristically occurring in young women, the pupillary abnormality is associated with sluggishness or absence of tendon reflexes.

*Marcus Gunn pupil*—On stimulation of normal eye by bright light there is no abnormality; when affected eye is stimulated reaction is slower, less complete and very brief so that the pupil may start dilating again (pupillary escape phenomena) Seen particularly in optic nerve damage due to multiple sclerosis

12. *Pupillary abnormalities in unconscious patient*—See Coma.
13 *Miscellaneous pupillary reactions*—

(a) *Hippus*—rhythmic contractions of the iris, regular in periodicity and visible to the naked eye, causing the pupils to alternately dilate and contract Causes—(i) Normal in some (ii) Rheumatic chorea. (iii) Disseminated sclerosis (iv) Brain tumor sometimes. (v) Alcoholic subjects. (vi) Unilateral in paralysis of third nerve.

(b) *Paradoxical pupillary reaction*—Pupils dilate instead of contracting on exposure to light Not uncommon in tabes.

(c) *Cilio-spinal reflex*—Reaction of pupil to painful stimulus of skin of neck causing the pupil to dilate; it is often absent in the early stages of tabes and in cervical sympathetic palsy.

principle is to introduce one drug at a time beginning with a small dose thrice daily and gradually increasing the amount till optimum relief is obtained or toxic effects become intolerable. Side effects are visual hallucinations, toxic confusional states, impaired visual accommodation and excessive dryness of the mouth. The initiating doses of commonly use drugs given t.d.s. are—Benzhexol (Artane) 2 mg, Orphenadrine (Disipal) 50 mg., Benztropine (Cogentin) 0.5 mg., Ethopropazine (Lysivane) 50 mg., Procyclidine (Kemadrin) 5 mg.

(b) *Antihistamines*—may have a potentiating effect e.g. Diphenhydramine (benadryl) 50-100 mg. at bed time.

(c) *Analeptics*—such as amphetamine sulphate 5-10 mg. daily will help relieve depression.

(d) *L-dopa*—Increases dopaminergic activity in the basal ganglia. Amelioration of hypokinesia is the most important effect.

*Dose*—Initial dose 250 mg. b.d. or t d.s. after food, increased by further 250 mg. at intervals of three or four days. If vomiting cyclizine hydrochloride 50 mg. t.d s. Increments of L-dopa should be continued until adequate response is achieved or until troublesome side effects occur. When side effects occur daily dosage should be reduced to highest tolerated level, and if this amount continued for a period, produces no benefit, a further attempt should be made to increase the dose. The daily intake should be increased by 0.5 gm. at intervals of ten to fourteen days. Average effective dose of L-dopa achieved gradually after 4 to 6 weeks is 5 gm. daily. Progressive alleviation of symptoms occurs for several months after treatment is started and maximum tolerated dose should be given for 6 months before the drug is discontinued because of its presumed ineffectiveness. *Drugs which should not be given*—to patients are pyridoxine because it counteracts the beneficial effects of the drug, and monoamine oxidase inhibitors because of danger of hypertensive crisis.

*Side effects*—(i) Nausea, anorexia and vomiting (ii) Involuntary movements—Grimacing movements of mouth, chewing movements of jaws, and rotatory movements of the tongue are the earliest and most frequent. Often these are accompanied by alternating flexion and

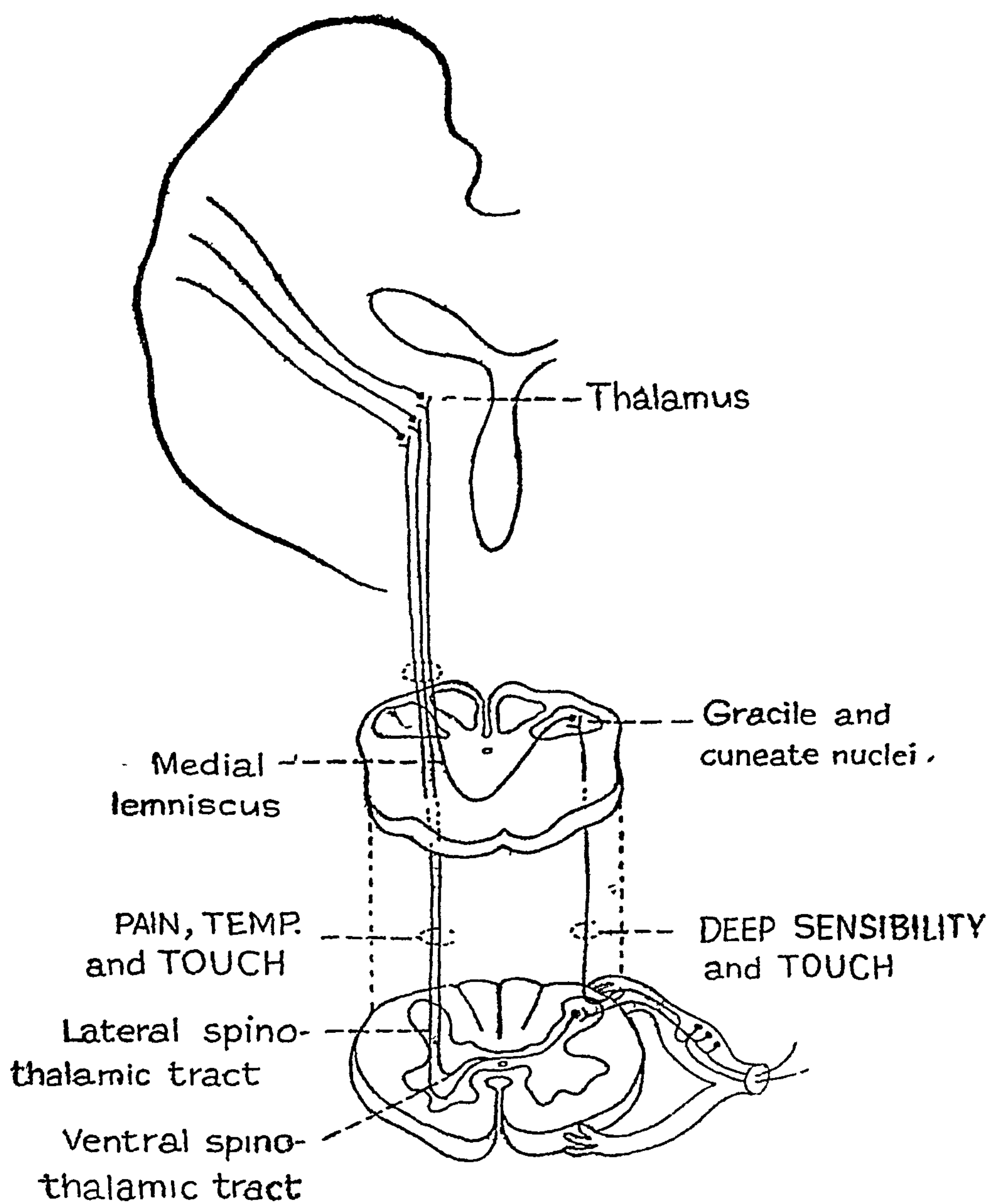



Fig 6 4 Diagram showing course of sensory paths to the thalamus and from there to the cerebral cortex

3. Affection of appreciation of size, shape, form, roughness and texture of objects (astereognosis), ability to distinguish between different weights (barognosis) and ability to recognise symbols written on the body, usually palms (graphaesthesia).

Combinations of drugs—L-dopa can be given together with amantadine and anticholinergic drugs to improve therapeutic result.

2. PHYSIOTHERAPY AND REHABILITATION—in the form of massage and passive stretching of muscles; posture and gait training, speech therapy and occupational therapy.
3. STEREOTAXIC OPERATIONS—Production of discrete destructive lesion in the basal ganglia by electrical coagulation or cooling in order to benefit tremors as well as rigidity. Surgical treatment is most successful in young patients with non-progressive and predominantly unilateral tremor, those with marked rigidity may also respond satisfactorily. Contra-indications—age over 65, gross arteriosclerosis or hypertension, signs of diffuse brain disease or mental deterioration, bulbar symptoms, or usually bilateral nature of the disease.
4. TREATMENT OF CAUSE—e.g. syphilis, cerebral tumor.

**Other extrapyramidal syndromes:**

1. **Wilson's disease (Hepatolenticular degeneration)—**

A disease of copper metabolism inherited as autosomal recessive trait. *Clinical features*—(a) Abnormal involuntary movements common being tremor and dystonia. (b) Cirrhosis of liver. (c) Kayser-Fleischer ring. *Biochemical features*—Low serum copper (<90 mcg. %), low serum caeruloplasmin (< 20 mcg. %) and high urinary copper excretion (usually more than 200 mcg/24 hours). These investigations may be normal in some patients but liver biopsy content of copper is almost always in excess of 250 mcg/g dry weight. *Treatment*—Penicillamine 1-2 g daily.

2. **Chorea—**

(a) *Sydenham's chorea* (Chorea minor)—(i) Chorea gravidarum. (ii) Chorea caused by contraceptive pill.

(b) *Huntington's chorea* (Chronic progressive chorea)—A hereditary disorder starting in early middle age and characterised pathologically by degeneration of ganglion cells of forebrain and corpus striatum and clinically by choreiform movements and progressive dementia. The rigid form may simulate Parkinsonism. *Treatment*—Tetrabenazine 75 mg. t d s. for about 10 days.

(c) *Senile chorea*—Choreiform movements following vascular lesions of brain in middle or old age. Usually of sudden onset and unilateral.

2. *Hemisection of spinal cord (Brown-Sequard Syndrome)*—Common causes are compression of cord, intramedullary neoplasms, sometimes due to stab in the back, bullet-wounds, vertebral fractures or caries, vascular causes, arachnoiditis. It comprises pyramidal and posterior column signs in ipsilateral trunk and limbs below the level of lesion, and spinothalamic sensory lesion on opposite side. At the highest level on the side of lesion there is a band of analgesia due to involvement of the root entry zone.
3. *Central (intrinsic) cord lesions*—e g., syringomyelia or intramedullary tumors. Dissociated anaesthesia, i.e., loss of sensation to pinprick, heat and cold, while touch with cotton-wool can be felt.
4. *Posterior column lesions*—e.g., subacute combined degeneration. (a) Loss of proprioception and vibration sense leading to ataxia. (b) Loss of deep pain (loss of tenderness of tendo-Achilles). (c) Positive Rombergism (ataxia occurs with eyes closed but not when they are open). (d) Hypotonicity (many spinocerebellar fibres travel in the posterior columns before entering the spino-cerebellar tract). (e) Diminished tendon reflexes (because of diminished proprioception).
5. *Posterior root entry zone*—e.g., tabes dorsalis Severe sensory ataxia, impaired tactile discrimination, and impairment of deep pressure sensation, and of position, joint and vibration sense.
6 *Conus medullaris*—There is loss of sensation in the saddle area—upper and inner thigh and perianally. Involvement of the roots of cauda equina produces loss of sensation along the roots involved along with involvement of deep reflexes. The plantar is never extensor in conus medullaris or cauda equina lesions.

**Peripheral nerve lesions—**

1. *Polyneuropathy*—Peripheral loss of sensation affecting both hands and feet (glove and stocking anaesthesia). Also in subacute combined degeneration and leprosy.
2 *Lesion of sensory root or of a peripheral nerve*—Loss of all forms of sensation over a clearly defined dermatome in one part of body only.

**Hysterical—**

Anaesthesia of "glove and stocking" distribution of the limbs. Unlike polyneuropathy, there is an abrupt line of demarcation

of fourth ventricle, but is instead directed downwards into the spinal canal. Then over the years the abnormal pulsatile force causes splitting of the fibres surrounding the central canal of the cord, a cavity develops from the split and expands to occupy a large portion of intraspinal space compressing the spinal tissue against the canal walls.

SYMPTOMS AND SIGNS—

1. Onset—(a) wasting and weakness of small muscles of hands; (b) loss of sensations; pain or trophic lesions.
2. Sensory symptoms—Dissociated sensory loss, usually first on one side. Cranial extension of the syrinx cuts the trigeminal fibres, producing a typical Balaclava helmet sensory disturbance with preservation of sensation around eyes, nose and mouth.
3. Motor symptoms—Wasting of small muscles of hands, contractures, bulbar paralysis (syringobulbia) with involvement of 7th, 9th and 10th cranial nerves and Horner's syndrome.
4. Trophic—Thickening of subcutaneous tissues, 'sausage fingers', Charcot's joints, ulcers, and necrosis of bones.
5. Associated abnormalities—Kyphoscoliosis, cervical rib, spina bifida, pes cavus.

*X-ray*—of cervical spine may show congenital anomalies or widening of the cervical canal. Myelography—The dye can be injected directly into the cavities, or demonstration of a collapsing cavity by injection of air into the spinal canal.

*Treatment*—is surgical with a view to prevent further deterioration. Decompression of foramen magnum or exploration of posterior fossa, or in advanced cases insertion of a silastic tube into the cavity, draining it into the subarachnoid space.

## Anterior horn cell diseases

(1) *Inherited*—

(a) *Infantile spinomuscular atrophy* (Werdnig-Hoffman disease)—Usually begins in second six months of life Genetically determined. Infant limp and floppy. Prognosis poor, death usually within first year.

5. Posterior root entry zone—Tabes, subacute combined degeneration.
6. Anterior horn cells—Poliomyelitis, progressive muscular atrophy.
7. Anterior nerve root—e.g., tumor.
8. Peripheral motor nerve—e.g, diphtheria, trauma.

B *Lesions outside the spinal reflex*—

1. State of cerebral or spinal 'shock' which occurs immediately after a severe cerebral catastrophe or spinal injury.
2. Muscle contracture—will produce depression in deep reflexes. Deep reflexes are depressed in paraplegia in flexion and in presence of extra-pyramidal rigidity.
3 Normal individuals unable to relax.

CAUSES OF EXAGGERATION—Organic lesion of pyramidal tract, tetanus, strychnine poisoning, hysteria, fright, anxiety, neurasthenia.

## Micturition reflex

Micturition is the reflex contraction of vesical muscle (detrusor) following release of cortical inhibition. The micturition reflex occurs at a spinal level (S2-4), but there are both inhibitory and facilitory supraspinal control. The voluntary restraint of micturition is mediated by fibres which arise in the frontal lobe and paracentral lobules and descend in the corticospinal tracts to the anterior and lateral horn cells at S2, 3, 4. Motor nerves run in the pudendal nerve to external sphincter and to muscles of pelvic floor. In the *spinal reflex arc* afferent fibres subserving muscle stretch sensation and proprioception travel from bladder wall in pelvic nerves to the sacral cord (S2-4), and efferent motor fibres pass distally along the same course Sensory impulses from the mucosa (especially trigone) take the same afferent course, or pass centrally in sympathetic nerves and are relayed through dorsal columns and spinothalamic tracts to the cortex for conscious awareness.

**Symptoms of bladder dysfunction**—The nature of bladder symptoms depend on whether the lesion primarily affects the supraspinal cortical, or motor and/or sensory loop of the reflex arc.

slowly progresses and the grip is affected or even wrist drop. Fasciculations prominent feature. Eventually extensive involvement of muscles of limb and trunk and loss of tendon reflexes. Later because of pyramidal tract involvement plantars become extensor and some degree of bulbar palsy develops. It is the most benign variety of motor neurone disease.

2. *Progressive bulbar paralysis*—Dysphagia is usually the first symptom followed by dysarthria. Nasal regurgitation of fluids and nasal and slurred voice. On examination there is paralysis of palatal, pharyngeal and tongue muscles; fasciculation of tongue muscles and exaggerated jaw jerk. Usually signs of pyramidal dysfunction in the limbs. Most patients succumb soon to respiratory infection.

3. *Amyotrophic lateral sclerosis*—Usual presenting symptom is difficulty in walking or dragging of one leg Spastic quadriparesis with exaggerated tendon reflexes and extensor plantar responses. No abnormality of sensation. Evidence of lower motor neurone dysfunction in the form of fasciculation in muscles of shoulder girdles and thighs and subsequent muscular atrophy may appear during the course of the disease. Even in presence of gross spasticity, abdominal reflexes are present. Sphincter disturbances do not occur until patient is bedridden.

INVESTIGATIONS—EMG shows chronic partial denervation with fasciculations and fibrillations Normal motor and sensory conduction velocities.

TREATMENT—is symptomatic.

## Hereditary Ataxias

**1. Spinal form—**

*Friedreich's ataxia*—Progressive familial disorder affecting posterolateral columns, spino-cerebellar tracts and cerebellum Associated with pes cavus, kyphoscoliosis and cardiac affection. Types—(a) Pure form. (b) Associated with peroneal atrophy, familial club foot and absent reflexes (Roussy-Levy syndrome). (c) Posterior column ataxia of Bremond.

2. *Abetalipoproteinemia* (Bassen-Kornzeig disease).

3. *Hereditary spastic paraplegia*—(a) Pure form. (b) With variants—amyotrophy, sensory neuropathy, optic atrophy, nystagmus, extrapyramidal features.

on efferent side. The bladder is partially paralysed (paralytic bladder) and hypotonic but here the bladder does regain tone and becomes capable of some functional activity.

| | Uninhibited bladder | Spinal bladder | Autonomous bladder | Sensory bladder |
|---|---|---|---|---|
| Lesion | Higher cerebral centres especially motor leg area of internal capsule | Spinal cord above sacral segment | Conus, cauda, pelvic nerves | Posterior columns, posterior roots involving sacral segments |
| Sensation | Normal | Vague unlocalised sense of fullness | None | None |
| Residual urine | Nil | Nil | + | +++ |
| Bladder capacity | Reduced | Reduced | Bladder large | Large atonic bladder |
| Voiding evacuation | Sudden and uncontrollable | Sudden and uncontrollable reflex | Straining or dribbling | Straining and dribbling |

Table showing main types of bladder neurogenic dysfunction.

MANAGEMENT—Use of indwelling catheter with all aseptic precautions in order to avoid infection. Antibiotics and bladder wash. Later on clamp catheter and release every 2-3 hours in order to develop optimum bladder tone.

## 8. INVOLUNTARY MOVEMENTS

### A. Epilepsy and convulsive movements:

1. FITS OR CONVULSIONS—Sudden purposeless and simultaneously disorderly movements often accompanied by alteration of consciousness—Grand mal, petit mal, focal cerebral seizures, etc. (See Epilepsy).

2. MYOCLONUS—Sudden shock like contractions occurring rhythmically. Often stimulated by sudden touching or by noise.

   *Causes*—(i) Physiological myoclonus—A physiological phenomenon occurring at onset of sleep. (ii) Myoclonus in idiopathic epilepsy. (iii) Progressive myoclonic epilepsy. (iv) Metabolic disorders—Renal, hepatic or respiratory failure; alcohol and drug withdrawal. (v) Structural brain disease—Encephalitis lethargica, postanoxic. (vi) Idiopathic benign (familial) myoclonus.

From a clinical point of view, the cerebellum can be divided into 2 basic regions:

1. *Midline structures*—consisting of lingula anteriorly, vermis in middle and flocculonodular lobe posteriorly. Midline lesions produce severe ataxia. Tumors at all midline sites produce obstruction of aqueduct of 4th ventricle resulting in headache and papilloedema.
2. *Cerebellar hemispheres*—consisting of small anterior lobe and large posterior lobe. (a) Unilateral lesions produce classical cerebellar signs on the same side. (b) Lesions of both hemispheres (e.g. cerebellar degeneration) give rise to mild cerebellar signs with moderate gait ataxia.

Most dramatic cerebellar signs are encountered in disease which involve cerebellar connections in brain stem.

EFFERENT CONNECTIONS—(i) Efferent fibres of cerebellar cortex project into deep cerebellar nuclei thus: (a) From vermis to the fastigial nucleus. (b) From intermediate zone to globose and emboliform nuclei. (c) Lateral zone to dentate nucleus.

(ii) Deep cerebellar nuclei, in turn, project to the cerebral cortex and certain brain stem nuclei via 2 main efferent pathways—(a) *Superior cerebellar peduncle* formed by fibres from dentate, emboliform and globose nuclei. These enter the upper pontine tegmentum as the brachium conjuctivum, decussate totally at the level of inferior colliculus, and ascend to the ventrolateral nucleus of thalamus, and to a lesser extent to the interlaminar nuclei. The major projection from the ventral thalamic nuclei is to area 4 of the cerebral cortex. A small group of fibres of superior cerebellar peduncle after decussation descend in the ventromedial tegmentum of brain stem and project to the reticulosegmental and paramedian reticular neclei. These in turn project mainly to the anterior lobe of the cerebellum via *inferior cerebellar peduncles*, thus completing a cerebello-reticular feedback system. (b) *Rubrospinal tract*—Efferent fibres from fastigial nucleus project to vestibular nuclei on both sides, and to a lesser extent to other nuclei of reticular formation in pons and medulla. Thus the cerebellum controls motor activity through its connections with the motor cortex and brain stem nuclei and their descending motor pathways.

**Causes**: of cerebellar ataxia—

**I. Acute**:

1. *Trauma*—causing small capillary bleeding.
2. *Infection*—Encephalitis, abscess.

the alternate contraction of opposing muscle groups They may be fine, medium or coarse.

CLASSIFICATION—1 *Tremor at rest* (Static tremor)—e.g., Parkinson's disease, anxiety, alcohol, drugs, thyrotoxicosis, benign essential tremor, Wilson's disease, neurosyphilis, mercury poisoning.

2. *Intention tremor* (Action tremor)—Coarse irregular oscillations of a limb during voluntary movements, e g, cerebellar disease, severe Parkinsonism, severe essential tremor.

CLINICAL TYPES

*Physiological or essential tremor*—Characteristically seen in the hands and sometimes the head and often precipitated by using the hands. It is frequently familial and aggravated by anxiety, tiredness, anger, fear and alcoholism.

*Cerebellar tremor*—(a) *Static tremor*—develops if patient attempts to maintain a limb in a fixed posture (b) *Action or intention tremor*—A disorder of co-ordination becomes evident in the distal part of the limb approaching its objective, e.g., in the finger nose test when there is a marked terminal wabble as the finger nears its object. Most frequently seen in disseminated sclerosis.

*Parkinsonian tremor*—Usually begins in one upper limb and later involves lower limb on same side, the other side being affected in the same order after a further interval Increased by emotional excitement and disappearing during sleep.

*Flapping tremor* (Asterixis)—detected at the wrists and fingers when the hands are outstretched Seen in hepatic precoma, may occur in uremia, barbiturate intoxication, $CO_2$ narcosis and respiratory failure

*Wing beating tremor*—a characteristic of Wilson's disease

*Pendular tremor* (Red nucleus tremor)—Most violent form of tremor almost invariably seen in multiple sclerosis. Tremor often present at rest causing jerky extension movements of head, and inarticulate speech. Slightest attempt to move the arm is followed by severe wide amplitude tremor.

*Searching movements*—with eyes closed when afferent input is affected as in posterior column or parietal lobe lesion.

*Infantile tremor syndrome*—Rapid tremors usually affecting the whole body Of unknown etiology. An open mouth, vacant expression, light coloured sparse hair, pallor and puffiness of face may be other characteristics

4. *Dysdiadochokinesia*—Disturbance of rapid alternating movements, e.g., rapid pronation and supination of fore-arm, or tapping the thigh alternately with the palm and the back of the hand.
5. *Rebound phenomenon*—Failure of antagonists to counter overshoot movements quickly, e.g., a muscle group when contracted against the resistance of the examiner's hand continues to contract if the later is suddenly removed.

III. DISORDERS OF GAIT—

1. Broad based.
2. Reeling gait.
3. Deviation to side of lesion.
4. Truncal ataxia (when seated).
5. Titubation.

B. **Non-localising:**

1. Static tremors due to hypotonia.
2. Skew deviation.
3. Nystagmus—on lateral gaze, particularly towards the side of a focal lesion.
4. Vertigo—Objects move away from the side of lesion. Sense of rotation of the body in same direction with intra-cerebellar lesion, in opposite direction with extra-cerebellar lesion.
5. Speech disturbances—Staccato explosive speech.
6. Depressed jerks.
7. Astereognosis.
8. Decerebrate rigidity.

**Differential Diagnosis:**

A. OF THE TYPE OF CEREBELLAR SYNDROME

| *Clinical features* | *Lobe* | *Causes* |
|---|---|---|
| 1. Disequilibrium mainly in legs No involvement of cranial n musculature | Anterior lobe | Alcoholism, malnutrition. |
| 2 Disequilibrium of stance and gait | Flocculonodular lobe | Neoplasms |
| 3. Cerebellar signs on one half of body | Posterior lobe | Actute lesion e g. infarct, abscess |
| 4. Bilateral cerebellar signs | Pan-cerebellar | Variety of causes |

thyroidism, sodium deficiency, organophosphorus poisoning. (4) Jacob-Creutzfeldt disease. (5) Collagen vascular disease.

2. *Myokimia*—(a) Fine, rapid rippling of muscle fibres most commonly seen in orbicularis oculi usually due to fatigue, common in psychoneurosis. (b) Coarser contraction of bundles of muscle fibres both visible and palpable commonly in outer aspect of thigh, arms, pectorals and intercostals common in fatigue and neurasthenic states. (c) Facial myokimia—Continuous movements likened to a 'writhing bag of worms'. The condition may occur in attacks and is usually associated with structural disease of the brain-stem, in particular with multiple sclerosis and intrinsic brain stem tumor, or in Guillain-Barre Syndrome.
3. *Craft spasm*—e.g., writer's cramp, basic cause being psychological disturbance.
4. *Flexor-extensor spasms*—in paraplegic patients.
5. *Blepharospasm*—Intermittent spasms of contraction of orbicularis oculi sometimes seen in Parkinson's disease or torsion dystonia, or provoked by neuroleptic drugs. May occur as isolated phenomenon and without apparent cause in middle-aged or elderly patients.
6. *Orofacial dyskinesia*—Spontaneous movements of mouth, lips and tongue in elderly and chronic psychiatric patients. Most commonly seen as a result of prolonged treatment with neuroleptic drugs. May occur in Huntington's chorea or torsion dystonia, or rarely spontaneously.
7. *Palatal myoclonus*—Regular, rhythmic contraction of soft palate, causing the uvula to bob up and down, and speech to be tremulous Usually appears acutely following vascular lesion in region of red nucleus, olive or dentate nucleus; may occur with tumors in the same region.
8. *Shivering*—Rapid regular movement of the whole muscle due to cold or nervousness.

DRUG-INDUCED INVOLUNTARY MOVEMENTS—(i) *Tremor*—bronchodilators, tricyclics, lithium. (ii) *Pseudo-parkinsonism*—Phenothiazines, butyrophenones like haloperidol, reserpine, tetrabenazine. (iii) *Acute dystonias*—Phenothiazines, butyrophenones, metoclopramide, diazoxide. (iv) *Akithisia* (inability to sit still)—Phenothiazines, butyrophenones. (v) *Tardive dyskinesias*—Phenothiazines, butyrophenones.

6. *Hereditary spastic paraplegia*—Familial condition with spastic gait, exaggerated tendon jerks and pes cavus. Arms may be involved. With brain stem involvement spastic dysarthria, dysphagia and emotional changes. Patients survive for many years.
7. *Friedreich's ataxia*—First signs of disease in adolescence or earlier. Generally bilateral signs. Dysarthria and nystagmus. Tendon jerks lost and plantars extensor. Pes cavus and kyphoscoliosis. Cardiac involvement.
8. *Sanger Brown's ataxia*—Cerebellar signs, optic atrophy, ophthalmoplegia. Same as olivo-ponto cerebellar atrophy.
9. *Marie's ataxia*—Cerebellar signs, pyramidal signs, family history.
10. *Progressive cerebellar degenerations*—(a) Primary parenchymatous degeneration of cerebellum (Holmes)—Starts in early middle life, with progressive cerebellar deficiency. (b) Olivo-ponto-cerebellar atrophy (Dejerine and Thomas)—Usually presents in middle age. Ataxia, tremor, disturbances of speech and characteristic Parkinsonian symptoms Disturbance of micturition and dementia may occur. (c) Olivorubrocerebellar atrophy (Lhermitte and Lejjone) resembles (b) above. (d) Delayed cortical cerebellar atrophy—resembles Holmes type but at a later age.
11. *Roussy-Levy syndrome*—Mild ataxia, dysarthria, nystagmus, absent tendon reflexes and pes cavus with some wasting of distal muscles.
12. *Refsum's syndrome*—Familial disorder of metabolism. Atypical retinitis pigmentosa, cerebellar ataxia and peripheral neuropathy. Thickening of peripheral nerves. Raised CSF protein.
13. *Alipoproteinemia*—(a) Alpha-beta-lipoproteinemia—Acanthocytosis, ataxia, absent reflexes and occasionally pyramidal signs. (b) Alpha-lipoproteinemia (Tangier disease)—Orange or yellowish grey discolouration of tonsils, hepatosplenomegaly associated with polvneuropathy.

## 22. DISEASES OF MUSCLE (MYOPATHIES)

**Definition:** The term myopathy may be used to define any disease in which the patient's symptoms and/or physical signs can be attributed to pathological, biochemical or electrical changes which are occurring in the muscle fibres or in the interstitial tissues of the voluntary musculature, and in which there is no evidence that the symptoms related to the muscles are in any way secondary to disordered function of the central or peripheral nervous system; this group of cases would include many diseases which appear to be genetically determined as well as those which are inflammatory, metabolic or endocrine in nature.

Clinical types: (1) Genetically determined. (2) Acquired.

A. MUSCULAR DYSTROPHIES—Genetically determined, primary, degenerative myopathies.

5. *Vestibular gait*—Deviation to same side when walking forwards and to the opposite side when walking backwards.
6. *High steppage gait*—Patient lifts the leg too high flinging the ankle up (slapping gait) due to foot drop. This type of gait when bilateral is seen in polyneuritis, muscular dystrophies, peroneal muscular atrophy and sometimes lesions of cauda equina.
7. *Stamping gait*—seen in tabes dorsalis where the patient walks on a broad base, lifts the legs unduly suddenly and violently, raising them too high and then bringing them down forcibly stamping the heels on the ground (stamping gait). May also occur in carcinomatous neuromyopathy or compressive lesions of posterior columns.
8. *Festinant or shuffling gait*—Movement in a series of small shuffles either due to rigidity of extrapyramidal disease or combined rigidity, instability and lack of confidence of cerebral arteriosclerosis.
9. *Waddling or duck-like gait*—The pelvis is rotated through an abnormally large arc, accompanied by compensatory movements of the upper trunk and associated with marked lordosis. Seen in muscular dystrophy.
10. *Jaunting gait*—in chorea. Sometimes one foot seems to be momentarily entangled by an invisible obstacle which holds the child back for an instant, or his knee may give way suddenly causing him to fall.
11. *Marche á petits pas*—Small steps of advanced cerebrovascular disease, a frontal lobe dysfunction.
12. *Hysterical gait*—A bizarre gait not resembling any known pattern of organic disease.
13. *Spastic springing gait*—In lathyrism—at first patient walks on tip toe, the body is raised high before the toes leave the ground, giving rise to up and down movements of the shoulder, and progression is affected by tilting the pelvis and circumducting the legs. The legs are crossed scissorwise Later patient uses one or two long sticks
14. *"Frog" like gait*—In later stages of muscular dystrophy when the power of standing erect is lost The patient crawls on hands and toes
15. *Violent contortions*—of spinal column when walking in torsion-dystonia.
16. *Transient dysbasias*—e g. intermittent arterial claudication. Normal walk at start, but after going some distance, patient stands still or sits down to rest till the spasm relaxes and then starts off again.
17. *Gait in myotonia congénita*—As soon as the patient starts to walk, the first steps are like those of a man dragging out of a deep mudhole but as the patient perseveres, the muscles become active and the gait normal.

known in any other disease and may be considered pathognomonic.

**(2) Autosomal recessive muscular dystrophy:**

(a) LIMB-GIRDLE DYSTROPHY—Either sex. Onset usually in third decade. (i) *Pelvifemoral form*—Weakness begins in pelvic girdle musculature (psoas, glutei and quadriceps) and results in waddling lordotic gait with difficulty in climbing stairs. Winging of scapulae may be apparent. (ii) *Scapulohumeral form*—Weakness confined initially to shoulder girdle and upper arm muscles. Deltoids are usually spared and may appear enlarged due to severe atrophy of upper arm muscles. Pelvic girdle musculature usually becomes affected at a later stage. The disease runs a variable course leading to severe diability in fourth or fifth decade. CPK is elevated and muscle biopsy shows nonspecific dystrophic changes.

(b) SCAPULOPERONEAL MUSCULAR DYSTROPHY—Presents in early adult life with foot drop due to weakness of anterior tibial and peroneal groups. Extensor digitorum muscle is characteristically spared and may be hypertrophied. The disease runs a benign course. Wasting and weakness in upper limbs is initially confined to scapular muscles but later spreads to involve biceps, triceps, forearm extensors and sometimes small muscles of hand.

(c) CONGENITAL MUSCULAR DYSTROPHY—One of the causes of 'the floppy infant'. Myopathy manifest at birth or early life. Small, weak, hypotonic muscles, proximal usually more affected than distal. Both sexes.

**(3) Autosomal dominant muscular dystrophy:**

(a) FACIOSCAPULOHUMERAL DYSTROPHY—Either sex. Onset usually in adolescence. Initial involvement, sometimes symmetrical, of facial and shoulder-girdle muscles, soon followed by weakness of anterior tibial and peroneal muscles, usually with spread within 20 or 30 years to pelvic muscles. Profound facial weakness produces pouting of the lips and a transverse smile. Slow insidious progression with periods of long arrest of the disease.

(b) DISTAL MUSCULAR DYSTROPHY OF WELANDER—Very rare. Presents with slowly progressive, predominantly distal

III. **Reflex causes—**

1. Ocular—Errors of refraction, glaucoma, iritis, etc.
2. Ear—Otitis, mastoiditis, vestibular nerve lesions, Eustachian tube block, tumors of middle and inner ear.
3. Teeth—Caries.

IV. **Psychogenic—**

Common cause of headache in neurotic, hypochondrial or hysterical individuals.

V. **Tension headache—**

Pain resulting from sustained contraction of skeletal muscle of the head and neck due to emotional tension.

**Investigation of a case of headache:**

I. **History—**

1. *Incidence*—Anxiety headaches, migraine, and those due to fevers, sinus disease and eyes most common.
2. *Onset and duration of headache—*
   (i) *Acute headache*—(a) Spontaneous subarachnoid hemorrhage—Previous history of bleeding may be obtained Acute severe occipito-nuchal pain occurs in patients taking amino-oxidase inhibitor drugs for mental depression and may closely mimic subarachnoid hemorrhage (b) Associated with hypertension. (c) Acute meningitis (d) Following concussion, lumbar puncture, alcohol withdrawal, asphyxia, or following epileptic attack. (e) Associated with fever
   (ii) *Subacute headache*—(a) Raised intracranial pressure—Tumor, abscess, hydrocephalus, raised venous pressure. (b) Cranial arteritis (c) Subacute or chronic meningitis (d) Subdural hematoma.
   (iii) *Chronic headache*—(a) Migraine—Headache for several hours at a time with intervals of complete freedom. (b) Migrainous neuralgia. (c) Due to anxiety, nervous tension or depression Tension headaches usually come on in the evening when patient is tired. Depressed patient complains of headache in morning. (d) Post-traumatic headache. (e) Hypertension. (f) Increased intracranial tension (g) Cough headache. (h) Pain from nasal, ocular and paranasal structures, and referred from vascular, neoplastic and degenerative lesions of brain stem. (i) Diseases of skull. (j) Miscellaneous causes—Anaemia, anoxia, withdrawal of caffeine, premenstrual tension, malaria, brucellosis.

*Treatment*—Procaine amide 250 mg.b.d. gradually increased to 4-6 gm. daily or diphenyl hydantoin 0.3-0.5 gm. daily. Corticotrophin helpful in some cases.

III. **Specific congenital myopathies**—are rare disorders which present with undue floppiness in infancy—(1) *Central core disease*—is characterised by presence of one or more cores which run axially along the fibres. The disease is compatible with a normal ambulant life. (2) *Nemaline myopathy*—runs a benign course in childhood but may later progress. Skeletal abnormalities such as scoliosis, high arched palate, arachnodactyly are common. (3) *Centronuclear myopathy*—involves extraocular muscles and muscles of face, limbs and trunk, and leads to severe disability. (4) *Fibre type disproportion*—also runs a benign course.

IV. **Metabolic myopathies**—

(1) DISORDERS OF MUSCLE GLYCOGEN METABOLISM—(a) *Acid maltase deficiency* (type II glycogenosis) in its infantile form is fatal before age of 2 due to accumulation of glycogen in heart, liver, CNS and muscle. Childhood and adult forms present with progressive myopathy resembling limb girdle dystrophy. (b) *Debrancher enzyme deficiency* (type III) usually presents in early childhood with hepatomegaly, ketonuria, fasting hypoglycemia and growth retardation. The condition usually resolves at puberty. (c) *Myophosphorylase deficiency* (type V glycogenosis)—usually presents in childhood or adolescence with weakness and muscle cramps, induced by exercise and relieved by rest. (d) *Phosphofructokinase deficiency* (type VII) presents with symptoms similar to myophosphorylase deficiency. There is mild hemolytic tendency.

(2) DISORDERS OF MUSCLE LIPID METABOLISM—(a) *Carnitine deficiency*—Systemic deficiency causes recurrent episodes of hepatic encephalopathy and metabolic acidosis which precede onset of myopathic weakness. Muscle carnitine deficiency presents with progressive myopathy in infancy or early childhood. Both disorders respond to steroids or oral carnitine. (b) *Carnitine palmityl transferase deficiency*—presents in adolescence with attacks of weakness, muscle cramps and myoglobinuria induced by prolonged exercise. Symptoms may persist for several days but may be alleviated by high carbohydrate intake prior to exercise.

(3) MYOADENYLATE DEAMINASE DEFICIENCY—has been reported in association with exercise intolerance and muscle cramp.

**II. Physical examination—**

1. Of the whole body including neurologic examination
2. Tenderness—of muscles of head and neck in myositis, of scalp in tension headache. Muscle spasm in meningitis. Local tenderness at site of periostitis of bone. Tenderness of scalp after head injuries.
3. Palpation of skull—may reveal the engorged and strongly pulsatile scalp artery of a migraine headache or tenderness and localised erythema of temporal or other cranial arteries.
4. Blood pressure.
5. Auscultation of mastoid region, and of eyes with the lids gently closed for a bruit.
6. Fundus examination.
7. Examination of sinuses.

**III Psychiatric evaluation—**

For depression, repressed hostility, aberrant personality problems, most patients with emotion-induced headache.

**IV. Investigations—**

1. X-rays—(a) Of paranasal sinuses (b) Of skull for evidence of increased intracranial tension or pineal shift. (c) Of cervical spine—for cervical spondylosis.
2. C S F.—for evidence of meningitis, cerebral abscess or subarachnoid hemorrhage.
3. Complete blood count—Leucocytosis in meningitis, sinusitis, cerebral abscess. Evidence of anaemia, dyscrasias, leukemia.
4. Serological tests—for neurosyphilis.
5. Urine—Chronic urinary infection.
6. Fasting blood sugar—Hypoglycemia.
7. Blood urea nitrogen—Uremia
8. ESR—Raised in temporal arteritis and infections.
9. EEG—High incidence of abnormality in patients with vascular headaches.
10. Cerebral arteriography—for tumor, berry aneurysm or angiomatous malformation.
11. CT scan—for diagnosis of intracranial tumors especially fast growing neoplasms such as pituitary tumors, acoustic neuroma, craniopharyngioma.
12. Pneumoencephalography and ventriculography—Air studies which directly outline the internal and external anatomy of the brain are useful when lesions of the cisterns or ventricles of the posterior fossa, brain stem, or cerebellum are suspected to be the cause of increased intracranial pressure.

3. *Edrophonium chloride* (Tensilon) *test*—useful if anti-AChR antibody measurement is not available or is negative in patients suspected of having myasthenia. If no side-effects develop after IV test dose of 1-2 mg, further 5-8 mg is injected. Positive response consists of obvious improvement in strength within 1 minute. This test can be combined with EMG.
4. *EMG studies*—include recording the response to nerve stimulation and single muscle fibre studies.
5. *Radiography*—of chest for thymoma. CT scan of thymus.

**Treatment:**

1. *Anticholinesterase therapy*—Pyridostigmine 30-120 mg every 3 hours or neostigmine bromide 15-45 mg every 3 hours. Neostigmine methylsulphate can be given subcutaneous or IM (15 mg oral = 1 mg IM). Side effects are due to parasympathetic stimulation—pupillary constriction, colic, diarrhoea, increased salivation, sweating and lacrimation.
2. *Steroids*—Prednisolone on alternate days. Initial 10 mg increased by 5-10 mg/week till symptoms are controlled or dose of 120 mg is reached. In severely ill patients high daily initial dose.
3. *Azathioprine*—2.5 mg/kg body weight. Improvement is slow. Blood count and liver function tests necessary.
4. *Combined azathioprine and prednisolone therapy*—useful in severe cases.
5. *Thymectomy*—in case of abnormal thymus or thymoma. Thymus irradiation in rare cases of malignant thymoma.
6. *Plasma exchange*—3-8 daily exchanges of 2-3 litres can produce striking short-term clinical improvement and, when combined with immuno-suppressant drug treatment, are useful in patients with severe disease.
7. *Management of crisis*—(a) Myasthenic crisis—occurs with inadequate treatment and can be precipitated by infection. Control of airway and ventilation, anticholinestarase medication if necessary. Immunosuppressive drug therapy and/or plasma exchange, if indicated. (b) Cholinergic crisis—due to excess anticholiestarase drugs—Control of airway and ventilation and temporary withdrawal of anticholinesterase drugs.

(i) Positive phenomena such as scintillating light or fortification spectra, or negative phenomena such as scotomas or hemianopic field defects which often follow the positive. (b) *Sensory symptoms*—Paraesthesiae and numbness which usually begin in upper limb and may spread to face but rarely lower limb. (c) *Motor symptoms and language disturbance*—Weakness in same distribution and dysphasia Prodromal symptoms may occur singly or in combination, and as they resolve the headache begins.

2 *Headache*—May be hemicranial or soon becomes generalised. Starts as vague pain and builds up to a throbbing intensity associated with pallor, anorexia, nausea, vomiting and photophobia. It may last for several hours and after vomiting has occurred, may decrease in intensity and be followed by sleep In some headache persists for 48 hours or more. During the headache the superficial temporal artery may be congested and pulsating.

**Migraine variants:**

1 *Basilar migraine*—Due to spasm of vertebro basilar artery. Usually starts in third decade and differs in symptomatology from classical migraine—Aura may include ataxia, bilateral paraesthisiae, vertigo, diplopia or even transient loss of consciousness. Headache is commonly occipital.

2. *Hemiplegic migraine*—Often familial. Headache is followed by contralateral hemiparesis or hemiplegia which may last upto 10 days Patient may have several attacks affecting one side of the body, whereas the next attacks may affect the opposite side.

3. *Common migraine*—More common than classical migraine. it is less often unilateral and not preceded by aura. Attacks are more often related to factors such as menstruation and relaxation after stress.

4. *Migrainous neuralgia (Cluster headache)*—Severe unilateral headache which lasts for minutes or hours associated with ipsilateral lacrimation, blocking of nostril, ptosis and miosis, tenderness and swelling of ipsilateral superficial temporal artery, and bilateral sweating. Recurs once or more often daily over a period of weeks or months More common in males

5. *Post-traumatic migraine*—A minor head injury or heading the ball in soccer players (footballer's migraine) may result

2. *Age of onset*—Muscular dystrophy, poliomyelitis and diphtheritic paralysis in infancy and childhood; motor neurone disease in second half of life, peroneal muscular atrophy and wasting of cervical rib pressure in early adult life, cervical spondylosis usually after 45.

3. *Distribution of wasting*—
   (a) *Proximal muscle wasting*—Muscular dystrophies, syringomyelia (in early stages), inflammatory lesions such as neuralgic amyotrophy, old poliomyelitis, myositis, compressive lesions of lower cervical roots, rarely in motor neurone disease. Cauda equina lesions cause wasting of buttocks.
   (b) *Peripheral muscle wasting*—(i) Forearm and small muscles of hand: Lower motor lesion affecting principally the segmental distribution C7-T1. This may occur at many levels—Anterior horn cells—Poliomyelitis, motor neurone disease, syringomyelia, cervical cord tumors. Anterior root—Cervical spondylosis or tumor. Brachial plexus—Injuries, cervical rib, cervical glandular enlargement, traumatic lesions of radial, median and ulnar nerves, carpal tunnel syndrome. Muscular lesion such as dystrophia myotonica. Involvement of joints—Rheumatoid arthritis. (ii) Lower leg—Wasting less common than in arm. Occurs as part of cauda equina lesion, polyneuritis, peroneal muscular atrophy, injury to external popliteal nerve. (iii) Both upper and lower limbs—Peroneal muscular atrophy, chronic polyneuritis, distal myopathy.
   (c) *Cranial musculature involvement*—early in myotonic dystrophy, facioscapulohumeral dystrophy and in the various ocular myopathies.
   (d) *Generalised wasting*—Malignancy, thyrotoxicosis, advanced stage of neurological disease such as myopathies and motor neurone disease.

4. *Muscular hypertrophy* (with normal strength)—occurs in myotonia congenita, in early stages of Duchenne and Becker dystrophy and occasionally in limb girdle dystrophy.

5. *Mode of onset*—Rapid in poliomyelitis and acute radiculitis. More gradual in diphtheritic paralysis, cervical spondylosis or tumor, and infective polyneuritis. In spinal lesions, atrophy usually precedes weakness, in polyneuritis, weakness precedes atrophy.

**B. Reducing frequency and severity of subsequent attacks—**

1. ELIMINATION OF FACTORS—which tend to cause attacks e.g. sleeping late, irregular and hurried meals, certain foods, especially chocolate and fried foods, or missing of meals, psychological stress, contraceptive pills, treatment of cervical spondylosis.

2. DRUGS—

(a) *Sedatives, tranquillizers and antidepressants*—such as diazepam when there is obvious tension Best used intermittently.

(b) *Methysergide* (Deseril)—Serotonin antagonist Most potent prophylactic. 2 mg. t d s. reduced to twice daily after a week. Main side effects are peripheral vasoconstriction, and retro-peritoneal or pleuroperitoneal fibrosis. These may be prevented by giving the drug not more than 3 months at a time with one month interval inbetween.

(c) *Pizotifen* (Sanomigran)—has antiserotonin and histaminic effects. Dosage—0.5 mg tablet once daily initially increased gradually to one tablet t d.s. The drug is virtually free from side effects.

(d) *Ergotamine tartrate*—for histamine cephalgia 1 mg. by mouth or 0.25 mg. by self-administered injection or by suppository used regularly last thing at night can be continued for many weeks without harmful effects, 2 days being left without treatment each week

(e) *Hormones*—Progesterone given for last eight days may be useful for migraine occurring in the immediate premenstrual period or at beginning of catamenia When migraine begins or becomes worse at the time of menopause, oestrin, given in small doses as continuous therapy sometimes helpful

(f) *Diuretics*—when tissue fluid retention is a likely factor in inducing attacks.

(g) *Anticonvulsants*—when there is personal or family history of epilepsy or related conditions involving loss of consciousness.

(h) *Propranolol*—has proved useful in some patients. Dose 20 mg b d. increased to 20 mg q.d s.

(i) *Cluster headaches respond to*—(i) Izotifen 0 5 mg t d s (ii) Inj. ergot tartrate 0 5 mg IM at night or twice a day. (iii) Cafergot 2 tablets at night (iv) Methysergide

defective neuromuscular transmission as in myasthenic syndrome.

4. *Measurement of nerve conduction velocity*—Normal in myopathies and spinal muscular atrophies, reduced in demyelinating polyneuropathy.
5. *Muscle biopsy*—Infiltration with fat and connective tissue to varying extent in muscular dystrophies, often with abortive regenerative activity. In polymyositis necrotic changes with inflammatory cell infiltration in perifascicular distribution. Normal in most metabolic myopathies. Electron microscopy useful in some metabolic and rare congenital myopathies.

## 25. POLYNEURITIS (POLYNEUROPATHY)

**Definition**—A clinical syndrome of multiple etiology, the essential feature of which is simultaneous impairment of function of many peripheral nerves, resulting in a symmetrical distribution of flaccid muscular weakness, and usually also of sensory disturbances, affecting as a rule the distal more than the proximal segments of the limbs.

**Causes:** (Mechanical or root syndromes excluded).

1. *Toxins or poisons*—
   (a) *Alcoholic polyneuritis.*
   (b) *Drugs and chemicals*—(i) Drugs—Isoniazid, nitrofurantoin, serotherapy, vincristine. (ii) Metals—Lead, arsenic, gold, thallium. (iii) Industrial compounds—Acrylanide, triorthocresyl phosphate, carbon disulphide, N-hexane.
2. *Avitaminosis*—Beriberi, pellagra, vitamin $B_{12}$ deficiency.
3. *Metabolic and endocrine disorders*—Diabetes, gout, myxodema, acromegaly, amyloid disease, chronic uremia, porphyria, dysproteinemia.
4. *Infections*—
   (a) *Systemic*—(i) *As a complication*—Diphtheria, tetanus, typhoid, dysentery, mumps, measles, influenza, smallpox, tuberculosis, meningitis, infectious mononucleosis, brucellosis. (ii) *As the main symptom*—Acute infective polyneuritis, 'rheumatic' polyneuritis, brachial neuritis, polyneuritis with parotitis and iridocyclitis.
   (b) *Local infections of nerves*—Leprosy.

## IDIOPATHIC EPILEPSY

**Etiology:** (1) *Age*—usually below 20 years. (2) *Sex*—almost equal. (3) *Heredity* common. (4) *Precipitating causes*—Pain, trauma, emotional disturbance, shock, photic stimulation such as flickering television set, noise or music, starvation with hypoglycemia, extreme fatigue, premenstrual state, fever, anoxia, alcohol, drugs such as amphetamine, ergot, cocaine, isoniazid, steroids, reserpine; withdrawal of anticonvulsant drugs, overhydration.

**Classification of epileptic seizures:**

I. **Primary generalised epilepsy:**

Generalised seizures more or less symmetrical, no evidence of focal onset.

1. GRAND MAL OR TONIC-CLONIC SEIZURES:
   (a) Prodromal period of irritability and tension for hours or days preceding the attack.
   (b) No aura. Loses consciousness without warning. Becomes rigid in extension, may urinate, and is apnoeic due to contraction of thoracic and abdominal muscles.
   (c) Tonic phase followed by clonic phase involving face, arms and legs.
   (d) Clonic phase stops and patient becomes flaccid and gradually recovers consciousness.
   (e) Post-ictal—Patient may go to sleep for a few hours, or remain confused for sometime, or there may be secondary automatism of which patient is amnesic.

2. PETIT MAL OR ABSENCE SEIZURES:
   (a) Abrupt stoppage of whatever patient is doing.
   (b) Stare ahead or tilt eyes up.
   (c) Unresponsive for 5 seconds to a minute.
   (d) Continues whatever he was doing before the attack.
   (e) Attacks may be several times a day accompanied by 3 cycles/sec spike and wave activity. Precipitated by hyperventilation.
   (f) Petit mal triad of absences, akinetic seizures and myoclonic jerks with 3 cycles/sec activity may occur in some patients, but if the EEG activity is slow, they are usually patients of symptomatic epilepsy.
   (g) May be accompanied by generalised convulsions

2. *Other investigations*—Urinary porphyrins, and heavy metals, plasma electrophoresis, serum cholesterol and triglycerides, CSF and radiological and endoscopic investigations for occult malignancy.
3. *Electrophysiological studies*—In generalized symmetrical neuropathies impairment of motor and/or sensory conduction.
4. *Nerve biopsy*—of sural or radial nerve.

**Management:**

1. *General*—(i) Elimination of possible toxic or infectious cause. (ii) Control of any existing metabolic or nutritional deficiencies—correction of anemia with iron or vitamin $B_{12}$, high protein diet, multivitamins.
2. *Local measures*—(i) Relief of pain—Hot packs or soaks, or infrared light or "heat cradle". Analgesics. (ii) Prevention of foot drop and wrist drop and contractures by splints or sand bags. (iii) Daily massage and passive movements as soon as calf muscles are less tender. Care should be taken not to overstrain weak muscles.
3. *Specific*—e.g., vitamin $B_1$ for thiamine deficiency, adequate control of diabetes, etc. Cortcosteroids may be helpful in chronic relapsing demyelinating neuropathies and some patients may respond to immunosuppressive or cytotoxic drugs.

## Peroneal muscular atrophy

(Charcot-Marie-Tooth disease)

*Clinical features*—Most common hereditary disorder of peripheral nerves appearing in second or third decade. Earliest signs are distal wasting of lower limbs with pes cavus and subsequent foot drop. Later the calf muscles and distal third of the thigh atrophy producing a 'stork leg' or 'inverted champagne bottle' appearance of the leg. Wasting of intrinsic hand muscles occurs and mild distal sensory loss is usual. The condition progresses very slowly over many years.

## Acute Infective Polyneuritis

(Guillain-Barre syndrome)

**Etiology:** *Age*—usually 20-50 years. *Sex*—Males predominate. *Antecedent infection*—usually upper respiratory virus in-

(3) PARTIAL SEIZURES, SIMPLE OR COMPLEX—evolving to generalised tonic-clonic seizures

(4) GENERALISED TONIC-CLONIC SEIZURES—with EEG, but no clinical evidence of focal onset (secondarily generalized seizures). However there need not be a full sequence of events.

*Partial seizures evolving to generalised tonic-clonic seizures*—The seizure discharge of any partial seizure may become generalised.

*Temporal lobe seizures* (or psychomotor seizures)—may result in (a) Epigastric sensation. (b) Hallucinations of smell, taste, vertigo or formed visual hallucinations (c) Disturbance of memory: Deja vu (sense of familiarity with unfamiliar environment), jamais vu (feeling of unfamiliarity with known environment) a forced recall of scenes or phrases. (d) Dreamy state, feeling of unreality. (e) Primary automatism—Complex automatic behaviour (e.g. repeated dressing and undressing) for which patient has no memory after the attack. (f) Affective disorder—Episodes of anxiety, fear, ecstacy, depression or paranoid feelings.

**Diagnosis of epilepsy (Convulsions):**

1. *History*—(a) *Age of onset* (i) Infancy—Metabolic disturbance associated with febrile illness, epilepsy, congenital diplegia, congenital hemiplegia and cerebral damage resulting from birth injury. Occasional sequel of meningitis. Rare degenerative disease such as amaurotic family idiocy. (ii) Childhood—Any of the congenital or acquired lesions above mentioned. Idiopathic epilepsy, encephalitis. (iii) Adult life—Idiopathic epilepsy rarely begins after age of 25 Penetrating head injury involving meninges, intracranial tumor, cysticercosis. (iv) After 50—epilepsy most often due to cerebral arteriosclerosis. Other causes such as Stokes-Adams attacks, and spontaneous hypoglycemia. (b) *Aura or other prodromata*—and sensations experienced during or after attack (c) *Description of fit from witness or family.* (d) *Circumstances under which fit occurs.* (c) *Associated features*—Such as mental retardation. (f) *Family history*—Fits which cause sudden loss of consciousness with falling, followed by some confusion should be classified as grand mal. (g) *History of febrile convulsions in childhood*

2 *Electro-encephalogram*—is of value in establishing the diagnosis of epilepsy and an aid in determining the type

**Management:** No specific therapy known.

1. Rest in bed—as long as any weakness of trunk muscles persists. Vital capacity should be measured every 2-4 hours in early stages.
2. Analgesics—Aspirin or paracetamol.
3. Hot packs—as in treatment of poliomyelitis may be useful.
4. Corticosteroids—for patients with bulbar symptoms or severe generalised weakness.
5. Antibiotics—to prevent secondary infection.
6. Vitamins—$B_1$ 100 mg. and vitamin $B_{12}$ 1,000 mcg. daily.
7. Supportive treatment—IV or intragastric feeding may be necessary.
8. Physiotherapy—Early active and passive movements. Splints to prevent foot and wrist drop.
9. Assisted respiration—if respiratory or bulbar paralysis.

MONONEUROPATHIES AND MULTIPLE NEUROPATHIES—

*Causes*—

1. Mechanical—Pressure or entrapment, e.g., carpal tunnel syndrome, tarsal tunnel syndrome.
2. Inflammatory—Leprosy, sarcoidosis.
3. Vascular—Polyarteritis nodosa, rheumatoid arthritis, Wegner's granulomatosis, SLE, systemic sclerosis, diabetes.
4. Infiltrations—Amyloid, neoplastic, xanthomatous.
5. Uncertain etiology—Brachial plexus neuropathy.

POLYNEURITIS CRANIALIS (multiple cranial nerve palsies)—

*Causes*—

1. Acute infective polyneuritis—Involvement of several cranial nerves in association with polyneuritis of the nerves of the limbs.
2. Inflammatory lesions within the skull—tuberculous meningitis, chronic syphilitic meningitis, osteomyelitis of bones at base of skull, otitis media.
3. Compression of multiple cranial nerves—by neoplastic infiltration of the meninges.
4. Painful ophthalmoplegia—A self-limiting ophthalmoplegic syndrome.

## 26. SCIATICA

**Definition**—Pain in the distribution of the sciatic nerve or its component nerve roots. The syndrome is now accepted as being caused by lumbar disc prolapse. However sciatic nerve lesions can occur due to pressure in the buttock or upper part of thigh.

2. *Symptomatic epilepsy*—For causes see p. 509.
3. *Conditions causing transient loss of consciousness*—See syncope.

**Management:**

1. General hygiene and diet—avoiding physical exertion, regular habits of eating and sleeping, adequate diet Avoid alcohol.
2. Drugs—Principles (i) Adequate therapy, aim being cessation of attacks. (ii) Dosage adjusted to particular patient, small initial doses. (iii) Combination of drugs if necessary. (iv) Continuity of treatment. Abrupt discontinuation of drugs dangerous (v) Drug should be continued for 2-3 years after the last fit.

*Anti-epileptic drugs:*

| *Drug* | *Avg. daily dose & Indication* | *Toxic effects* | *Remarks* |
|---|---|---|---|
| (1) *Barbiturates*: Phenobarbitone (Luminal) | 200 mg. GM | Drowsiness, rash, ataxia, tremors, impotence, mental confusion. | One of the safest drugs |
| Mephobarbital (Mebaral) | 500 mg. GM | Drowsiness, rash, ataxia. | Usually has no advantage over phenobarbital. |
| Primidone (Mysoline) | 150 mg. GM, PS | Drowsiness, ataxia | May be effective in otherwise refractory grand mal. |
| (2) *Hydantoins*: Diphenylhydantoin sodium (Dilantin) | 500 mg GM, PS | Rash, gum hyperplasia, irritability, ataxia and vertigo. *Megaloblastic anaemia*; rarely agranulocytosis or aplastic anaemia. | Effective in major epileptic attacks Advantage of little *or no hypnotic* effect. |
| Mephenytoin (Mesantoin) | 300-600 mg GM+PM | Same as dilantin but no hypertrophy of gums | May prove effective in refractory cases Monthly blood counts necessary because agranulocytosis more likely. |

ness of nerves. (iii) Intensification of pain in back and leg during rotatory extension of lumbar spine very suggestive of ruptured disc. (iv) Popliteal compression—Radiating pain can often be aggravated by pressure over the course of the tibial nerve through the popliteal fossa. It is an additional finding in favour of root compression. (v) Testing of the sacroiliac joints by pressure on the two anterior superior iliac spines. (vi) Estimation of range and painlessness or otherwise of hip joint by passive stretching. (vii) Muscle power in the lower limb tested against resistance. (viii) Elicitation of knee and ankle jerks—When L4 root is involved, the knee jerk is depressed and there is likely to be weakness of tibialis anterior muscle. With L5 root lesions, both knee and ankle jerks usually remain brisk but there may be weakness of dorsiflexuon of the toes particularly of extensor hallucis longus. When S1 root is involved, the ankle jerk is lost and weakness, when present, involves the calf muscles. (ix) Tone and size of gluteal muscles judged by asking patient to contract both buttocks; in upper sacral root lesions marked wasting may be clearly visible.

3. *Sensations*—Impairment of perception of pin-prick commonly found on dorsum of foot if implication of 5th lumbar and 1st sacral nerve roots.
4. *Presence of tender nodules*—in paraspinal muscles and along iliac crest may be found in sciatica due to inflammation of muscular and fascial structure.
5. *Rectal examination*—in older patients.

**III. Investigations—**

1. *X-ray*—(a) Straight X-rays—for detecting disc narrowing in lumbar spine, or lesion of sacro-iliac or hip joint. (b) Myelography to localise level of disc protrusion and to differentiate such lesions from tumors.
2. *C.S F.*—may show increased protein with normal cell count in large protruded intervertebral disc.
3. *EMG*—may be used to confirm presence of denervation in affected muscles.
4. *Procaine injection test*—for diagnosis of fibrositic pain; contact with needle aggravates local pain and elicits referred pain; procaine suppresses both, and freedom of leg and spine movement is restored.

| *Drug* | *Avg daily dose & Indication* | *Toxic effects* | *Remarks* |
|---|---|---|---|
| Acetazolamide | 500 mg PS | Drowsiness, paraesthesia, blood dyscrasias, renal lesions | Useful as adjuvant to other therapy in petit mal. |
| (9) *Carbamazepine:* (Tegretol) | 800 mg GM PS | Nausea, headache, dizziness, drowsiness, Allergic skin reactions Leucopenia. | Possesses both anti - convulsant and psychotropic properties |
| (10) *Benzodiazapines:* Nitrazepam | 40 mg Myoclonic seizures PM (and hypsairhythmias) | Sole use may provoke grand mal Lethargy, unsteadiness | At night to control morning myoclonus. |
| Diazepam | PM absences GM Myoclonic jerks | Drowsiness, ataxia in higher doses | Useful adjuvant in resistant cases. |
| Clonazepam | 20 mg max adult dose | Drowsiness, ataxia, dyskinesia hyper - excitability, hypotension | Atypical absences if sodium valproate fails |

Gm = grand mal. PS = psychomotor epilepsy. PM = petit mal

*Other antiepileptic agents*—Corticotrophin (ACTH gel) 40-60 units/day IM or prednisolone maximum 50 mg/day of value in myoclonic spasms of infancy and in resistant petit mal.

*Plan of management*—Gardenal and Phenytoin are both effective and cheap drugs and should be tried first Phenytoin should be avoided in children because of its toxic effects. Hirsutism produced by Phenytoin causes cosmetic problems in young women and should be used only if necessary. The initial dose will depend on the frequency of convulsions, the age of the child and the neurological examination. It is necessary to start on a minimal dose and gradually increase it so that an optimum dose can be reached. A single dose therapy is advocated and adequate trial with each drug is necessary before another drug is added. Serum levels of drugs where possible will help in adjustment of dosage.

3. Elimination of causative factors—Surgical removal of operable tumors of brain, evacuation of brain abscess, treatment of endocrine abnormalities or removal of scar tissue following traumatic injury to the brain.

7. *Major lesions in the buttock*—such as acute osteomyelitis of ilium or upper femur, ischio-rectal abscess pointing into buttock, septic gluteal bursitis. Straight leg raising and hip flexion both very painful. (In sciatica due to disc lesion hip flexion is not limited.)

8. *Arthritis of the hip*—Hip movements restricted and pain provoked by passive movements. Radiograph of pelvis diagnostic.

9. *Intermittent claudication*—When internal iliac artery is affected alone, claudication in gluteus maximus on walking may be the only symptom. Diagnostic signs—Patient lies prone and his hip is extended passively; this causes no pain. He is then asked to keep the leg extended for a minute, this brings on the claudication.

   *Spinal claudication*—is to be suspected when the patient gets pins and needles in both lower limbs on walking a certain distance. Examination shows all arteries of the lower limbs to be patent. The cause is intraspinal ischemia of the nerve-roots compressed by a disc lesion or involved in arachnoiditis.

10. *Dissecting aneurysm*—A rare cause of sciatica is a slowly expanding aneurysm at the bifurcation of aorta compressing 3rd and 4th lumbar nerves and causing local pain and accompanied by paraesthesia and weakness in left lower limb. Patient complains of severe backache. Aortography should be done.

**Management:**

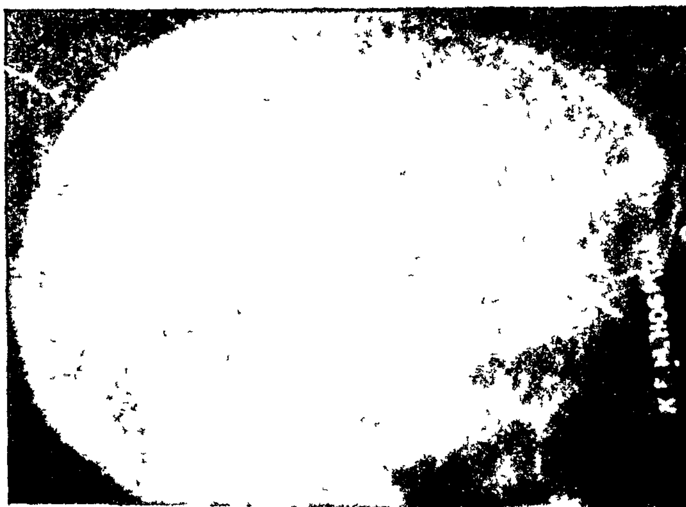
A. Symptomatic sciatica—

1. *Acute stage*—(i) Rest in bed with boards under the mattress to support the back. (ii) Analgesics as required. (iii) Heat. (iv) Injection of 2% procaine or of lignocaine into the sciatic nerve or epidural space or tender spots in the sacro-iliac region may give dramatic relief.

2. *Chronic stage*—Management will depend on cause. Conservative management—(a) High sciatica—(i) Injection of tender spots with 5% procaine. (ii) Counter-irritation, heat and massage. (iii) Epidural injection—10 ml. of 2% novocain, followed by 80 to 100 ml. of normal saline; repeated once a week. Many patients with sciatica due to extradural adhesions may be benefited by injection of 30 ml. 1% procaine hydrochloride mixed with 125 mg. hydrocortisone injected into the epidural space. Three



Intracranial calcification due to tuberculoma (For other causes of calcification see radiological signs Chapter 14 19)



Radiograph of skull showing lytic lesions (punched out areas) in multiple myeloma Similar osteolytic lesions may appear with metastatic carcinomas (as from the lung, breast or thyroid)

dermatomes corresponding to the affected radicular nerve. Tendon reflexes innervated by affected segments likely to be diminished or lost.

(b) *Symptoms of cord compression due to cervical myelopathy*—Main initial symptoms are dysaesthesiae in the hands, weakness and clumsiness of the hands and spastic weakness of the lower limb. When, as is commonly the case, the cervical enlargement ($C_5$, $C_6$ and $C_7$) is involved, there is a combination of diminution of some tendon reflexes with exaggeration of others. The triceps jerk is most commonly diminished or lost. There may be some impairment of appreciation of light touch and pinprick over some or all the digits.

(c) *Pain in the neck*—Acute disc protrusion is likely to be associated with severe pain, muscular spasm and rigidity of the neck muscles. In chronic cervical spondylosis pain is usually comparatively mild and tends to be more severe in the morning.

(d) *Headache*—Characteristically the pain is occipital and is often described as spreading up over the back of the head to the frontal region. It is usually worse in the morning.

(e) *Vertebro-basilar ischemia*—Often rotation to one or other side or extension of the neck and, less frequently, flexion may precipitate a brief attack of giddiness or a drop attack. In these patients movement of the head probably causes pressure on the vertebral arteries with consequent impairment of the blood supply of the hindbrain.

Radiological changes—(a) Reduction of one or more disc spaces. (b) Changes in the normal curve of the spine. (c) Formation of osteophytes. (d) Sclerosis of parts of the vertebrae adjacent to the damaged discs. (e) Myelography usually shows filling defect.

Management—Bed rest and analgesics in acute painful stage. Collar may be used day and night to start with, and gradually let off as symptoms improve. As pain subsides active exercises for neck and shoulders combined with heat treatment. Head traction with or without manipulation may be tried provided there are no signs of cord compression. If signs of cord compression are increasing operation gives best results.

## 12. CEREBROVASCULAR DISEASES

**Definition**—The term "stroke" is defined as rapidly developed clinical signs of a focal disturbance of cerebral function of presumed vascular origin, and of more than 24 hours duration Cerebrovascular disease may take the form of any combination of cerebral hemorrhage, infarction and ischemia

**Classification:**

A **Cerebral ischemic disease of arterial origin:**

1 Transient ischemic attacks (TIAs) with total recovery.
2. Progressing stroke or stroke in evolution.
3. Completed stroke (established cerebral infarct) from (a) thrombosis, (b) embolism.

B **Venous infarct.**

C **Subarachnoid hemorrhage.**

### Cerebral Ischemic Disease of Arterial Origin

1. **Transient ischemic attacks (TIAs)**—TIA is a focal disturbance of neurological function caused by vascular disease and lasting usually few minutes to 24 hours, and leaving no deficit. Symptoms may be unilateral loss of vision, monoparesis or hemiparesis, hemisensory loss, hemianopia or dysphasia. Incidents may occur daily or be widely separated. Important cause is carotid artery stenosis.

2. **Developing** (progressive) **stroke**—Sometimes paralysis progresses slowly commensurate with increasing deprivation of blood due to successive emboli or extension of thrombus further occluding the lumen. It evolves gradually over several hours.

3 **Completed stroke**—caused by infarction of the cerebral hemisphere is the most common cause of an acute cerebrovascular accident A completed stroke reaches its peak in less than one hour leaving considerable residual deficit

**Syndromes of the cerebral arteries:**

Middle cerebral artery—(a) *Stem occlusion*—Contralateral hemiplegia, with initially equal involvement of both upper and lower limbs, hemianaesthesia, and often hemianopia. Dysphasia if lesion in dominant hemisphere. (b) *Branch occlusion*—(i) Inferior division—receptive aphasia without paralysis. (ii) Superior division—motor-sensory deficit with a speech disorder without receptive aphasia. Middle cerebral artery is the region most frequently affected in embolic and thrombotic disease.

sensation radiating into the hand on percussing the median nerve at the wrist. (iii) Phelan's sign—Reproduction or exaggeration of symptoms after holding the wrist in complete flexion for 30-60 seconds. Atrophy of the thenar muscles is also seen, but this usually does not appear early. Compression of the median nerve in the carpal tunnel usually occurs in middle-aged women, but may occur in either sex due to arthritis, myxoedema, acromegaly, fracture of wrist. Also premenstrual or use of contraceptive pills in females.

**5. Vascular conditions—**

Those producing sensory disturbances in arm include occlusion of brachial artery due to embolus, or ischemia from polyarteritis nodosa, scleroderma and other conditions grouped under the term Raynaud's phenomenon. Inspection of the skin, changes in temperature and colour of the limb, and inadequate pulse at the wrist facilitate diagnosis. Coronary insufficiency may be responsible for pain in the ulnar aspect of arm and forearm.

—Takayasu's disease, syphilis. (e) Congenital arterial anomalies—Loops, kinks, fibromuscular dysplasia. (f) Infections—Tonsillitis. (ii) Hematological disease—Sickle cell disease, polycythemia rubra vera, essential thrombocythemia, thrombotic thrombocytopenic purpura, hyperviscosity syndromes, e.g., myeloma, paroxysmal nocturnal hemoglobinuria. (iii) Rare causes—Pregnancy and puerperium, migraine, oral contraceptives, hypoglycemia, homocystinuria. Occasionally hypotension in presence of extremely stenosed artery.

(iii) *Cerebral embolism*—(i) *Cardiac sources*—(a) Left atrium —Thrombus in patient with atrial fibrillation commonest cause. Myxoma. (b) Mitral valve—Bacterial endocarditis, rheumatic endocarditis, marantic endocarditis, prosthesis, mitral annulus calcification. (c) Left ventricle mural thrombus—Myocardial infarction, cardiomyopathy, sinoatrial disease. (d) Aortic valve —bacterial, rheumatic or marantic endocarditis, sclerosis and calcification, syphilis, prosthesis. (e) Congenital cardiac disorders (f) Paradoxical embolism from the venous system. (ii) *Embolism from proximal arterial thrombi.*

## HEMIPLEGIA

**Causes:**

**A. Sudden onset—**

1. Vascular causes.
2. Intracranial infection—Encephalitis, meningitis.
3. Trauma—Depressed fracture.
4. Hypertensive encephalopathy.
5. Post-epileptic paralysis.
6 Multiple sclerosis.
7. Uremia.
8. Hysterical.

**B Slow onset—**

1. Cerebral tumor.
2. Cerebral abscess.
3. Internal carotid artery occlusion sometimes.
4. Chronic subdural hematoma.
5. Meningitis, encephalitis.
6 Chorea.
7. General paralysis of insane.
8. Congenital defects—diffuse sclerosis, cerebral agenesis.

*Determination of the side of hemiplegia in an unconscious patient—Away from the paralysed side*—Conjugate deviation of eyes. *On the hemiplegic side*—(i) Cheek puffs out dur-

C. **Transparency**—Freshly passed normal urine is clear and transparent. Cloudiness may be due to: (a) Amorphous phosphates—form a white sediment in neutral or alkaline urine which disappears on addition of acid. (b) Amorphous urates—White or pink cloud which disappears on heating. (c) Blood—Reddish-brown or smoky colour. (d) Bacteria——Uniform cloud or opalescence. (e) Chyluria or milky urine—due to blocking of thoracic duct by filaria or inflammatory or neoplastic conditions, with consequent rupture of lymphatics of the bladder. (f) Spermatozoa and prostatic fluid.

D. **Colour**—In general depth of colour depends on volume of urine voided and varies roughly with specific gravity. (a) *Colourless*—in polyuria and diabetes insipidus. (b) *Dark colour*—concentration as in fevers. (c) *Dark yellow*—bile, riboflavin, carotene containing foods. (d) *Red*—Drugs: Nitrofurantoin, rifampicin, phenindione, disferrioxamine, thiazosulphone, phenazopyridine. Hemoglobinuria, beeturia, favism. (e) *Red brown*—Urates, porphyria, myoglobinuria. (f) *Dark brown to black*—Alkaptonuria, tyrinosis, melanosis. (g) *Green to greenish blue*—Methylene blue, Ps. aeruginosa infection, indigo compounds. (h) *Cloudy*—Leucocytes, bacteria, urates (acid urine), oxalates (alkaline urine). (i) *Smoky*—Trace of erythrocytes.

E. **Odour**—Characteristic "aromatic" odour most marked in concentrated urine. Odour becomes ammoniacal during decomposition; a cloudy urine with an ammoniacal odour suggests cystitis or pyelitis, usually with obstruction in the urinary tract. Fruity odour in diabetes. Urine containing cystine may develop odour of sulphuretted hydrogen during decomposition. Articles of diet and drugs impart peculiar odours, e.g. asparagus and turpentine.

F. **Reaction**—of fresh urine usually acid with an average pH about 6.0. *Strong acid reaction*—in acidosis, diabetes mellitus, gout, lithiasis, acute articular rheumatism, chronic nephritis, leukemia and scurvy. Also after ingestion of acids, saccharin, or high protein diet, and drugs like mandelic acid and ammonium chloride. Urine becomes alkaline on long standing. *Marked alkalinity*—of fresh urine usually indicates ammoniacal decomposition in bladder, e.g. chronic cystitis; the alkalinity is volatile, i.e. litmus paper will turn blue if held in steam of boiling urine. Fixed alkalinity may be due to alkaline salts, frequent vomiting, anemia, digestion of full meals (alkaline tide), abundant eating of fruits.

symptoms in multiple sclerosis. Congestive attacks of GPI.

(c) *Headache*—In cerebral hemorrhage the headache is intense with accompanying stiffness of neck, in carotid insufficiency the headache is temporal and usually on the side of the ischemia, in basilar artery insufficiency the headache is occipital or suboccipital. Severe headache is felt in subarachnoid hemorrhage at the onset Headache and vomiting may occur in cerebral tumor or abscess and subdural hematoma. Vomiting preceding a stroke favours a diagnosis of hemorrhage.

(d) *Chest pain*—suggests associated myocardial infarction.

(e) *Symptoms suggestive of hysterical hemiplegia*—(i) Onset after emotional shock (ii) Hysterical type of rigidity. (iii) Plantars never extensor. (iv) Hoover's contralateral leg sign—when patient attempts to raise the paralysed leg, the opposite heel does not make counter pressure backwards on the palm of the examiner's hand as in organic hemiplegia. (v) Contraction of platysma present on affected side. (vi) Hysterical gait

(f) *Coma*—Sudden or rapid loss of consciousness at onset common in subarachnoid hemorrhage, intracerebral hemorrhage and brain stem strokes. In subdural hematoma increasing drowsiness and spontaneous variations in coma, the patient may pass from consciousness into coma and back again in a few hours.

(g) *Jacksonian fits*—in tumor.

(h) *Fever*—in meningitis, encephalitis and cerebral abscess.

(i) *Involuntary movements*—in encephalitis and chorea. In chorea usually upper limb alone is paretic.

(j) *Mental symptoms*—in dementia paralytica, encephalitis and sometimes tumor.

(k) *Abdominal pain and melena*—suggest gastro-intestinal bleeding as the precipitating cause.

(l) *History of acute infections*—Hemiplegia may rarely be a complication of typhoid, pneumonia, small-pox, typhus, diphtheria, etc.

II. **Physical examination—**

A. NEUROLOGIC—

1. *State of consciousness*—may vary from full alertness to lethargy, stupor, semiconsciousness or coma.

*Tests for albumin*—The simplest test for albumin is the boiling test. For this purpose the urine must be clear, if opalascent it must be filtered. A test-tube is filled with two-thirds urine and the top portion gently heated over a flame, 2 or 3 drops of acetic acid should be added and the urine boiled. If turbidity appears in the urine on boiling and it persists after the addition of acetic acid it indicates presence of albumin and the amount of precipitate indicates the amount of albumin If the turbidity disappears on addition of acetic acid the turbidity is due to phosphates.

*Mucin*—Traces in normal urine. Increased amounts in irritation and inflammation of urinary tract or vagina.

*Bence-Jones protein*—may be found in multiple myeloma, chronic leukemia, osteomalacia. It precipitates on warming the urine to 40° to 60°C but dissolves almost completely when the temperature is increased to 100°C.

2. SUGARS—*Glycosuria without hyperglycemia*—Renal glycosuria, alimentary glycosuria after ingestion of considerable amounts of carbohydrate, glycosuria of pregnancy. *Glycosuria with hyperglycemia*—Hyperthyroidism, emotional glycosuria, increased intracranial pressure, thiazide diuretics, ether anaesthesia. (Also see page 461).

*Qualitative test of sugar*—To 5 ml. of Benedict's qualitative solution add 8 drops of urine Boil the solution over a flame for 2 minutes. Depending on the amount of sugar the urine changes its colour from blue to green and then to yellow or brick red and a precipitate appears.

3. ACETONE BODIES (Ketonuria)—(a) Diabetes mellitus—in which normal carbohydrate ketabolism is lacking. (b) Starvation in which a deficient carbohydrate diet is the cause of abnormal fat consumption.

*Rothera's test for acetone*—Take 5 ml. of urine and saturate with ammonium sulphate crystals. Add 3 drops of a freshly prepared solution of sodium nitroprusside and on top of this add 2 ml. of strong ammonia. Development of a permanganate colour indicates presence of acetone and acetic acid. A faint reaction is of no significance.

4. PIGMENTS—

(a) *Bile pigments*—(i) *Bilirubin*—Detection of small amounts of bile of value as one of the earliest signs of acute infective hepatitis. Small amounts transiently in acute cholecystitis or cholelithiasis without obvious jaundice. (ii) *Urobilinogen*—Increased urobilinogen is found in hemolytic anemia and liver cell dysfunction.

(b) *Hemoglobin*—Hemoglobinuria occurs in extensive burns, poisoning by mushrooms and potassium chlorate, blackwater fever, symptomatic hemolytic anemias, and paroxysmal hemoglobinurias.

arteries would suggest a disease in the internal carotid artery on the side of the low pressure.

### III. Investigations—

MANDATORY INVESTIGATIONS

| | |
|---|---|
| *Blood:* | |
| Hb., white cell count and hematocrit | Polycythemia, anaemia, infection |
| Platelet count | Thrombocythemia, thrombotic thrombocytopenic purpura |
| ESR | Arteritis, SBE |
| Blood glucose | Diabetes, hypoglycemia |
| Urea and electrolytes | Hypertension, diuretics |
| VDRL | Syphilis |
| *Urine* | Polyarteritis nodosa |
| *Radiographs* | |
| Skull | Calcification in carotids, raised intracranial pressure, shift of pineal |
| Chest | Pulmonary embolism, pneumonia, heart size, valve calcification |
| *ECG* | Myocardial infarct, arrhythmia, cardiac disease |

OPTIONAL INVESTIGATIONS

| | |
|---|---|
| Blood culture | SBE |
| Sickle cell screen | Sickle cell disease |
| Echocardiography, cardiac catheter | Cardiac source of embolism |
| Plasma lipids | Hyperlipidemia |
| Protein electrophoresis | Myeloma, etc. |
| Antinuclear factor | Systemic lupus |
| Cervical spine X-ray | Trauma, spondylosis |
| EEG | Encephalitis, focal epilepsy |
| Homocystine in urine | Homocystinuria |
| Porphyrin in urine | Porphyruria |
| Temporal artery biopsy | Giant cell arteritis |
| Muscle or renal biopsy | Polyarteritis nodosa |

OTHER INVESTIGATIONS:

*CSF*—to differentiate between hemorrhage and infarction, or if possibility of encephalitis, neurosyphilis or multiple sclerosis. (Contraindicated if space-occupying lesion).

*In alkaline urine*—

*Phosphates*—in osteitis fibrosa cystica, administration of parathyroid hormone, alkalosis, compensatory measure in acidosis to help maintain acid base balance.

*Calcium carbonate*—as amorphous granules, or rarely as colourless spheres and dumb-bells.

*Ammonium biurate*—"Thorn apple" crystals.

2. ERYTHROCYTES—Red cells from glomeruli are irregular in size and shape, red cells from renal pelvis, ureter and bladder are of uniform morphology.
3. LEUCOCYTES—Increased number in urethritis, cystitis, prostatitis, pyelitis and pyelonephritis, tuberculosis of kidney, and following catheterization. White cell casts are very uncommon; they are seen in acute pyelonephritis.
4. CASTS—are cylindrical structures that form within the kidney tubules by the coagulation of proteins.

*Hyaline*—consist of Tamm-Horsfall mucoprotein. They are found in most forms of chronic renal disease. Small numbers common in fevers, after exercise, anaesthesia, or loop diuretics.

*Granular*—(i) *Faintly granular*—are hyaline casts with few granules of albumin, lipoprotein or immunoglobulin incorporated in their matrix. They are found in same conditions as excess hyaline casts. (ii) *Densely granular*—are found in all forms of glomerulonephritis, diabetic nephropathy, and in large numbers in amyloid disease, and malignant phase of essential hypertension.

*Waxy*—Advanced stages of glomerulonephritis and renal amyloid disease.

*Fatty*—Fat droplets embedded in hyaline casts in nephrotic syndrome.

Granular, epithelial, fatty and lipoidal casts all point to degenerative changes in the tubular epithelium.

*Cellular casts*—are hyaline or granular casts with tubular epithelial cells on their surface. Those with only an occasional cell are common in many forms of renal disease; casts thickly covered with tubular cells are characteristic of acute tubular necrosis and the rapidly progressive and acute types of glomerulonephritis White cell casts in acute pyelonephritis.



'Pepper pot' appearance of skull in secondary hyperparathyroidism Note erosion of clinoid processes



Myelography showing spinal compression There is a defect in the column of the contrast medium at the site of lesion (L4-L5)



Charcot's joint in tabes dorsalis Such osteo-arthropathy may be found also in syringomyelia, diabetes, or any cord or root lesion causing severe sensory denervation

binding to the GBM, triggering the complement cascade, and producing characteristic linear immunofluorescence. This mechanism accounts for only about 5% of cases.

B. CIRCULATING IMMUNE COMPLEX (IC) DEPOSITION DISEASE—accounts for majority of cases of GN. There is a granular appearance on immunofluorescence. The syndrome of acute nephritis is considered to be due to deposition of small, circulating soluble complexes which develop as a consequence of initial infection. The glomerulonephritis develops as a result of the inflammation which arises from the localization of the complexes and the subsequent activation of the complement and coagulation system.

*Offending antigen*—in most cases in unknown but likely agents are (1) *Acute immune complex disease*: Exogenous antigens such as (a) iatrogenic agents—Drugs, toxins and toxoid, and foreign serum proteins. (b) Bacterial—Nephritic strains of streptococci, strep. pneumoniae, B. typhosus, meningococcus. (c) Viral—Echovirus, after acute infective polyneuritis, influenza virus. (2) *Chronic immune complex disease*—(a) Exogenous antigens—(i) Bacterial—Staph. albus, enterococcus (SBE), treponema pallidum (secondary syphilis). (ii) Parasitic—Pl. malariae and falciparum, schistosoma mansoni. (iii) Viral—Hepatitis B, Epstein-Barr virus (Burkitt's lymphoma). (b) Endogenous antigens—(i) Nuclear antigens in SLE, thyroglobulin, tumor antigens, IgG-IgM in cryoglobulinemia. (c) *Presumed immune complex diseases*—Henoch-Schonlein purpura, Wegner's granulomatosis, cirrhosis of liver, Hodgkin's disease, sarcoidosis.

C. T-CELL DYSFUNCTION—may play a part in the pathogenesis of minimal change nephropathy, thus accounting for occurrence of this form of nephritis in Hodgkin's disease.

D. CELL-MEDIATED IMMUNITY—This is restricted mainly to transplant rejection.

**Classification:**

CLINICAL:

I. *Acute glomerular nephritis*—(a) Acute nephritic syndrome. (b) Acute renal failure.

II. *Persistent glomerular nephritis*—(1) Rapidly progressive. (2) Chronic—(a) Recurrent hematuria. (b) Persistent proteinuria (with or without red cells). (c) Nephrotic syndrome. (d) Chronic renal failure.

| | *Embolism* | *Thrombosis* | *Hemorrhage* |
|---|---|---|---|
| Stiff neck .. | Rare | Rare | Frequent |
| Conjugate deviation of eyes | Rare | Seldom | Frequent |
| Bilateral extensor plantar | Rare | May be present | Frequent |
| Reaction of pupil to light | No change | May be impaired | Commonly impaired |
| Blood pressure | Normal | May be high | Usually high |
| 6 *CSF* | Usually normal. Pleocytosis if infected embolus | Clear, pressure slightly increased | Usually bloody, pressure increased |
| 7. *CT scan* | Infarction may not appear for 2-4 days | May not appear for 2-4 days | Can be confirmed within minutes of onset |
| 8 *Termination* | Recovery usual | Recovery often | High mortality |

**Localization of site of lesion:**

| SITE OF LESION | LOCALIZING SYMPTOMS |
|---|---|
| *Cortex* | Flaccid hemiplegia with cortical sensory loss. Aphasia common. Convulsions may occur. |
| *Internal capsule* | Commonest site. Hemiplegia. Hemianesthesia if lesion in posterior one-third. No loss of consciousness. Spasticity marked. |
| *Thalamus* | *Thalamic syndrome*—(i) Fleeting hemiparesis or hemiplegia on the side opposite the lesion. (ii) Impairment of superficial and loss of deep sensation on the opposite side of the body (iii) Elevation of threshold to cutaneous, tactile, thermal, and painful stimuli, but these when perceived have an abnormal painful quality. (iv) Intolerable, spontaneous pains and hyperpathia on opposite side. (v) Ataxia, tremor and/or choreoathetoid movements on the opposite side. (vi) Conjugate internal deviation of both eyes with weakness of upward gaze. |

nantly in males. The most common mode of presentation is with recurrent hematuria.

## Acute Nephritic Syndrome

### I. Classical acute glomerular nephritis

**Etiology:**

1. Age—most common in childhood.
2. Sex—more in males.
3. Infecting organism—Beta-hemolytic streptococcus.
4. Site of infection—usually throat, or skin e.g. scabies, impetigo, furunculosis.

**Clinical features:**

*Modes of onset*—(a) Oedema—puffiness of face. (b) Urinary symptoms—scanty and smoky or frankly bloody urine. (c) Symptoms of acute infection—Fever, bodyache, vomiting. (d) Cerebral symptoms—Headache, convulsions. (e) Insidious onset—Weakness, pallor, loss of appetite. (f) Accidental discovery—on routine urine examination.

SYMPTOMS AND SIGNS—

1. *Oedema*—may come on suddenly or gradually. Puffiness of face and whitish pallor constitute "nephritic facies", swelling of face usually in morning. Generalised anasarca may occur. Oedema may be absent in mild cases and also in very severe cases.
2. *Hypertension*—An elevation of blood pressure occurs in majority of cases the diastolic pressure being 90 to 120 mm. usually. The hypertension as a rule persists for atleast one week, returning to normal a few days after patient has had diuresis. In 5 to 10 per cent cases hypertensive encephalopathy develops, the clinical features being severe headache, vomiting, fits, hemiparesis and other focal signs such as aphasia. There are associated mental changes such as confusion, disorientation and coma. The rise of pressure may give rise to signs of pulmonary oedema. The jugular venous pressure is commonly elevated and with peripheral oedema presents a picture of congestive cardiac failure. Renal retention of salt and water is responsible for the circulatory disturbance in acute nephritis.

## Management of hemiplegia:

**Hemorrhage—**

(a) Surgical evacuation of an intracranial hematoma beneficial in selected cases: (1) Hemorrhage into cerebellum. This is characterised by relative retention of power and sensation in contradistinction to pontine or capsular lesions, with small pupils, gaze palsy, cerebellar ataxia and peripheral facial palsy (2) Surgically accessible clot in a patient with good level of consciousness but a persistent neurological deficit after a trial of medical management for a period of one week. (3) When progressive cerebral oedema and coning necessitates surgical decompression.

**Thrombosis and Embolism (Cerebral infarction)—**

A. SUPPORTIVE THERAPY—

1. *Position in bed*—Patient should be nursed with the head in a flat position. Disturbance of autoregulation in patients with stroke results in decrease in cerebral blood flow (CBF) if the head is elevated The patient should be kept in semiprone position in order to avoid falling back of the tongue Frequent change of position is necessary to prevent lung congestion and bed sores.
2. *Maintenance of airway*—If patient is unconscious maintenance of clear airway is important. The tongue must be kept forward, if necessary by use of an airway. The mouth must be clear of pillows so that when the patient vomits obstruction is less likely to occur.
3. *Maintenance of hydration and nutrition*—In the unconscious patient this can be achieved by passing a Ryle's tube In first 24 hours 5% glucose solution (2000 ml) is adequate. This can be replaced after 24 hours, when the danger of vomiting or active regurgitation is passed, by milk, sugar, eggs, salt and vitamins. Feeds are given 2-hourly preferably just after the patient's position is changed.
4. *Care of the skin*—Areas of reddening of the skin over heels, ankles, buttocks, shoulders and elbows are an indication of impending pressure necrosis and indicate that the patient is not being turned frequently enough.
5. *Care of the bladder and bowel*—Incontinent patients may require sterile indwelling catheters and bowel care since dampness and infection predispose to the formation of de-

melena, the renal features being hematuria and proteinuria.

7. *Acute nephritic syndrome due to other multisystem diseases*—Systemic lupus erythematosus, Wegener's granuloma, Goodpasteur's syndrome.

**Course**—Complete recovery occurs in majority of children and in about 50 per cent of adults. Even when acute renal failure develops the patient may recover despite oliguria lasting for several weeks. Hematuria, which is often exacerbated by exertion, commonly persists for 6-12 months before complete recovery. Slight protenuria persists for many months before returning to normal.

**Complications:** (a) Acute renal failure. (b) Acute heart failure with pulmonary oedema. (c) Hypertensive encephalopathy. (d) Urinary tract infection is common, especially if oliguria is prolonged. (e) Renal or urinary tract pain occurs occasionally as a result of clot colic. (f) Arthritis occurs rarely and suggests multisystem disease.

**Management:**

1. *Rest in bed*—diminishes risk of pulmonary oedema and hypertensive crises. In a mild case, 3 weeks often suffice; in more severe cases it must be continued for at least 3 months. Persistence of microscopic hematuria, or proteinuria under 1 gm./day does not justify prolonged bed rest. The patient should be allowed to be up and about once urinary findings have become stationary. Bowels should be kept open.
2. *Restricted fluids*—(Fruit juices contain potassium and should be used with caution in oliguric patients). First 24-28 hours only 500 ml. of water and glucose or barley water. After that if urine volume in 24 hours is less than 400 ml. treat as for acute renal failure. If urine volume is more than 400 ml. limit intake of fluid to 500 ml. plus a volume equal to that passed in preceding 24 hours; low salt, low protein diet can be started.
3. *Diet*—Low protein diet. If patient is oedematous or has engorged neck veins, the diet should contain very little sodium

   Breakfast—Fruit or small glass of fruit juice.
   1-2 thin slices of bread with little butter with honey or jam. Milk or tea.

taste, or IV as 500 ml of 10% glycerol in 5% glucose or normal saline over a period of 3-4 hours daily for first 4 to 6 days of acute cerebral infarction. No rebound increase in intracranial pressure after discontinuation as may occur after mannitol. (c) *Steroid therapy*—Dexamethasone 16-20 mg. IV or IM for first 5 days, followed by gradual withdrawal over the next few days. Antacids should be given simultaneously. (d) *Furosemide*—40-80 mg. daily IV. Of special value in patients with LV failure in whom mannitol would be risky.

5. *Low molecular weight dextran*—It reduces platelet adhesiveness, reduces the aggregation of red cells in the zone of vasoparalysis in area of infarct and improves the microcirculation in areas of ischemia, thus reducing the area of infarction. It is administered as infusions of 500 ml of 10% solution in 5% dextrose, or in 0.9% saline and should be given over 5 to 6 hours or a longer period for 3 to 10 days.
6. *Anticoagulant therapy*—Therapy of choice in patients with embolic episodes due to cardiac valvular disease or following replacement by prosthetic valve.
7. *Antiplatelet drugs*—have been successfully used in male patients with TIAs, while the response in females has been poor. They may be tried in prosthetic valve replacement or cardiac valvular disease, if anticoagulants cannot be prescribed Drug combination of Aspirin 12mg/kg/day and Dipyridamole 2mg/kg/day or Sulphinpyrazone 200 mg t.d s. act synergistically.

D. Surgical treatment—for TIAs. It is wise to start treatment at once even after one TIA, since the next vascular event may be catastrophic. (a) *Carotid endarterectomy*—Removal of stenosing and/or ulcerating atheromatous lesions at bifurcation of common carotid artery. (b) *Superficial temporal to middle cerebral artery anastomosis*—Using microsurgical techniques, an artificial collateral blood supply from external carotid artery to a distal branch of an inaccessibly stenosed or occluded internal carotid or middle cerebral artery can be achieved

E. Physiotherapy and Rehabilitation—During the acute phase, the aim should be prevention of deformities. The patient's limbs should be maintained in optimal position. Passive physiotherapy should be started after 36 to 48 hours. The joints should be moved through full range of motion. Muscle

## Clinical varieties:

**1. Rapidly progressive nephritis—**

*Clinical features*—Hypertension, oedema, proteinuria and microscopic hematuria continue till the patient dies of renal failure or hypertension in 6-18 months after initial attack. Death from uremia occurs in about 1½-2 years of onset.

*Treatment*—Salt restriction and diuretics for oedema, hypotensive agents for the hypertension and oral antibiotics to prevent recurrence of streptococcal or other infection. Low protein diet if blood urea more than 100 mg./100 ml.

**2. Chronic nephritis—**

CLINICAL FEATURES—

(a) *Persistent proteinuria*—After an apparent recovery from attack of acute nephritis or asymptomatic proteinuria discovered at routine examination. After a variable period of upto 20 years, hypertension and renal failure supervene.

(b) *Nephrotic syndrome*—About half the patients who develop chronic glomerulonephritis pass through a nephrotic phase with hypo-albuminemia, oedema and massive proteinuria (See Nephrotic syndrome). Superimposed acute nephritis produces acute exacerbation.

(c) *Persistent hematuria* (Recurrent focal nephritis)—Hematuria begins with onset of sore throat and may last several weeks. No oedema or hypertension. In between attacks patient is well. Many patients also have persistent proteinuria.

(d) *Chronic renal failure*—Final stage. In majority the symptoms of advanced chronic renal failure, hypertensive cardiac failure, or malignant hypertension are the first indication of its presence. Symptoms and signs of uremia—nausea, vomiting, hiccough, fatigue, anemia (normochromic, normocytic); dyspnoea, pruritus, pericarditis, bloody diarrhoea, nocturia. Often the only symptom before the onset of uremia is nocturia for a period of months or years.

LABORATORY FINDINGS—(a) *Urine*—Specific gravity round about 1010. Proteinuria 1-2 g/24 hours. Microscopic hematuria, excessive leucocytes. Casts—granular, broad granular and waxy renal failure casts. (b) *Blood urea*—rises progressively, the rise being associated with increasing acidosis.

2. AFTER RUPTURE—

(a) *Symptoms due to rapidly increasing intracranial pressure with meningeal irritation*—The intensity of symptoms depends on rapidity and persistence of hemorrhage. Loss of consciousness with generalised flaccidity occurs when leakage is considerable. In less severe cases the patient may remain semi-stuporose with severe headache and signs of meningeal irritation, —headache, photophobia, neck stiffness and Kernig's sign.

Fever—Moderate pyrexia common.

Fundus—Unilateral or bilateral hemorrhages in some cases, may be accompanied by subhyaloid and vitreous hemorrhages.

(b) *Focal symptoms*—due to compression of neighbouring cranial nerves by blood clot, or to invasion of the cerebral hemisphere by the hemorrhage—(i) Visual field defect from compression of optic nerve, chiasma or tracts. (ii) 3rd, 4th and 6th nerve involvement if aneurysm near cavernous sinus (iii) Mental impairment, hemiparesis, and if on left side expressive aphasia from hemorrhage from aneurysm at junction of anterior cerebral and anterior communicating arteries invading the frontal lobe. (iv) Epileptiform convulsions and monoplegia if leakage of aneurysm in cortical course of middle cerebral. (v) Crossed homonymous hemianopia if in course of posterior cerebral due to hemorrhage into substance of posterior lobe. (vi) Basilar artery aneurysm and leakage will cause either quadriplegia or crossed paralysis. (vii) Hemorrhage into posterior fossa will give rise to conspicuous head retraction.

*Investigations*

*C S.F.*—Pressure raised, red cells with supernatant fluid xanthochromic. Proteins increased slightly and mononuclear pleocytosis usually due to irritation of meninges by extravasated blood.

*Angiography*—may reveal the causal lesion in about two-third cases It should be done unless the patient's condition contraindicates surgery because of shock, old age, atheroma of severe degree or hypertension, even if the lesion is demonstrated.

reveal changes suggestive of tuberculosis such as incomplete visualization of one or more calyces, a fuzzy outline of a calyx, a cavity, hydronephrosis or nonvisualization of the entire kidney. Cystoscopy may demonstrate diffuse cystitis, tubercles, ulcerations or 'golf-hole' ureters.

4. *Polyarteritis nodosa*—Hypertension and renal failure with often arthropathy, neuropathy and pyrexia.
5. *Systemic lupus erythematosus*—may present with renal involvement. The commonest finding is persistent symptomless proteinuria usually accompanied by microscopic hematuria.
6. *Polycystic kidneys*—Hypertension, cardiac hypertrophy, hematuria and renal insufficiency simulate chronic nephritis. Palpable kidney tumors and diagnosis by radiology.

MANAGEMENT—of chronic glomerulonephritis consists of —(i) Control of hypertension with suitable hypotensive agents such as methyldopa or vasodilators (ii) Treatment of anemia by blood transfusion. (iii) Low protein diet. (iv) Dialysis (See treatment of chronic renal failure).

SALT-LOSING NEPHRITIS—As the glomerular filtration rate (GFR) falls, the remaining living nephrons undergo osmotic diuresis and the loss of sodium in urine causes 'salt-wasting' or 'salt-losing nephritis'. The common causes of salt-losing nephritis are (a) Chronic renal failure. (b) Pyelonephritis (c) Addison's disease. This can be treated by careful resalination by giving 250 ml of 3 per cent sodium chloride.

PRIMARY (RECURRENT) HEMATURIA—After exclusion of other recognised causes, there remains a group of patients in whom hematuria originating in the kidney is the main, or even the only symptom, visible hematuria being recurrent but microscopic hematuria persistent. The patients are usually children or young adults mostly males. Hematuria begins abruptly especially after exertion or 1-3 days after upper respiratory tract infection. Renal colic and dysuria may occur.

## 3. THE NEPHROTIC SYNDROME

**Definition**—The term nephrotic syndrome is a clinical condition in which there is oedema, proteinuria and hypoproteinemia irrespective of etiology or any other additional abnormal clinical features.

**Causes :**

1. Neonatal nephrotic syndrome.
2. Idiopathic nephrotic syndrome.
3. Secondary nephrotic syndrome—
   (a) *Nephritic*—Nephrotic stage of glomerular nephritis.

function of the patient's ascending reticular activating system. (ARAS) in the diencephalon, midbrain and upper pons. Coma may result from either infratentorial or supratentorial structural lesions, or toxic or metabolic derangements of cerebral function.

**Causes:**

1. **Supratentorial lesions:**

   Cerebral hemorrhage.
   Massive cerebral infarction with oedema.
   Subdural or extradural hematoma.
   Space occupying lesion (SOL)—Brain tumor, abscess.

2 **Brain-stem lesions:**

   Infarction.
   Pontine hemorrhage.
   Cerebellar hematoma
   Tumor.
   Secondary effects of mass lesion in cerebral hemisphere

3 **Systemic causes:**

   (a) *Metabolic*—Anoxia, respiratory, cardiac, hepatic or renal failure Hypoglycemia. Wernicke's encephalopathy.
   (b) *Endocrine*—Diabetic coma, myxoedema, Addison's disease, pituitary apoplexy.
   (c) *Drug overdose and poisons*—Barbiturates, organophosphorus poisoning, alcohol, etc.
   (d) *Physical agents*—Hypothermia, heat stroke.

4 **Diffuse intracranial disorders:**

   Head injury.
   Meningitis.
   Encephalitis.
   Hypertensive encephalopathy.
   Epilepsy.
   Cerebral malaria.
   Subarachnoid hemorrhage.

5. **Psychogenic.**

**Diagnosis of Coma:**

I **Supratentorial mass lesions:**

1. Signs of causative lesion—e g., hemiparesis, papilloedema.
2. Signs due to expanding mass lesion causing downward displacement of the temporal lobe over the edge of the tentorium (uncal herniation), or midline compression of the upper brain-stem:

5. *Blood pressure*—There may be periods of hypertension; ultimately with development of chronic nephritis permanent hypertension may develop.

**Laboratory findings:**

1. *Urine*—(i) Oliguria while oedema is forming, diuresis or normal amount of urine during period of subsidence of oedema. (ii) Proteinuria—Massive, usually more than 5 g/day though variable from time to time; urine becomes almost solid on boiling. Daily loss of protein may be 20-50 g. (iii) Red blood cells absent or few. (iv) Casts— Fatty casts, tubular cells, oval fat bodies, doubly refractile bodies.
2. *Blood*—(i) Anemia—slight, normochromic. (ii) Hypoalbuminemia—Serum albumin usually less than 3 g/100 ml. Total serum globulin concentration frequently lowered with often elevation of $\alpha_2$ and $\beta$ globulins. (iii) Hyperlipoproteinemia (LDL level in particular) and hyperfibrinogenemia (contributing to raised ESR).
3. *Renal biopsy*—of value in the diagnosis of the cause and also in judging prognosis. *Indications*—(a) Usually necessary in patients over the age of 10 years. Majority of childhood nephrosis below 10 show minimal change pattern. (b) Presence of hematuria. (c) Hypertension. (d) Reduced renal function in absence of severe hypovolemia. (e) Lowered serum complement level. (f) Non-selective differential protein clearances. If one or more of these signs is present it is very unlikely that the patient has a 'minimal change' lesion but mostly will have changes of structural damage to the kidneys.

**Differential Diagnosis:**

1. *From acute glomerular nephritis*—

| | *Acute glomerular nephritis* | *Nephrotic glomerular nephritis* |
|---|---|---|
| Previous illness ... | Preceding streptococcal infection | No previous illness |
| Age ... | Predominantly school going child | Most often seen in pre-school child |
| Onset ... | Sudden onset | Insidious |
| Oedema .. | Rarely severe | Presenting feature and rapidly becomes massive |
| Hypertension . | Invariably present | Usually absent |
| Urine .. | Many red cells | Few red cells |
| Azotemia . | Present | Absent |
| Recovery .. | In 90% | May occur |
| Death ... | Due to uremia or left ventricular failure | Uremia may develop after months or years Secondary infections common |

2. Preserved pupillary responses (except in cases of anoxia and glutethimide poisoning).
3. Eye movements—full conjugate, or absent in deep coma.
4. Limbs—Symmetrical movements, reduced tone and usually depressed reflexes.
5. Respiration—In drug-induced coma, e.g., barbiturates, respiration is regular but slow and depressed or Cheyne Stokes.
6. In some metabolic causes, e.g., hepatic or respiratory failure delirium precedes deterioration in consciousness Flapping tremor, generalised myoclonus, muscle twitching, and acidotic respiration may be seen.

**Investigation of a case of coma:**

**A. History—**

1. *Mode of onset*—Abrupt loss of consciousness in cerebrovascular accidents and epileptic states, rapid and in a period of few hours in some cases of intracranial hemorrhage and some toxic states; gradual over days in expanding intracranial lesions.
2. *Premonitory symptoms*—Complete absence of premonitory symptoms would suggest a primary intracranial vascular accident.
3. *Headache*—with vomiting, progressive mental changes, increasing weakness or unsteadiness of limbs would suggest an expanding intracranial lesion. Severe headache and vomiting at onset with immediate loss of consciousness in hypertensive patient favours diagnosis of intracerebral hemorrhage.
4. *History of severe psychological disturbance*—raises possibility of self-administered drug intoxication.
5. *History of alcoholic intake.*
6. *History of head injury.*
7. *History of bleeding diathesis*—Non-traumatic intracerebral hemorrhage is usually associated with systemic hypertension, but may occur in patients with bleeding diathesis.
8. *Recent symptoms suggestive of a tumor*—e.g., headache, personality change or insidious hemiparesis.
9. *Symptoms of cerebellar hemorrhage*—Headache, vertigo and vomiting, with unilateral cerebellar ataxia, would suggest occurrence of hemorrhage into one cerebellar hemisphere.

Breakfast—Fruit or small glass fruit juice with sugar or glucose.
2 eggs or fish or porridge with milk.
2 slices bread with butter or 3 chappatis.
Jam or honey.
Tea or coffee or milk.

Mid-morning—1 cup tea or coffee with milk and sugar
2 plain biscuits.

Lunch—Large helping of meat, chicken or fish.
Vegetables (except cabbage, onions, turnips, cauliflower, beans).
Potatoes.
Milk pudding or light sweet.
Fruit.

Tea—2 slices bread made into sandwich with filling of hard boiled or scrambled egg, meat or chicken.
Butter milk or tea with milk and sugar.

Dinner—Meat or fish or 2 eggs.
Vegetables if desired.
2 slices bread or chappatis.
Milk pudding or jelly with milk.

Bed time—Milk drink or plain biscuit.

Allowance: 1 pint of milk (Instead of milk low-sodium protein concentrates such as casilan may be used).
1-1½ oz. butter (saltless if desired).
2 oz. sugar.

(This diet is suitable for cases of *cirrhosis of liver* also but there should be more restriction of fat.)

(b) *Diuretics*—very useful. For mild oedema bendrofluazide 5-15 mg/day. For severe oedema frusemide. Diuretics must be used with caution if the patient is very oedematous and hypovolemic. Indicators of hypovolemia are a cold periphery and a fall in diastolic pressure on sitting or standing up.

(c) *Antibiotics*—Prophylactic penicillin should be given against possible pneumococcal peritonitis and septicemia.

MANAGEMENT OF RELAPSE—Relapses may be associated with bacterial or viral infection especially of upper respiratory tract. Treatment consists of—

lateral conjugate eye deviation, i e., if the head is rotated to the right the eyes deviate to the left. Next the neck is briskly flexed and extended. A positive response is deviation of the eyes upward when the neck is flexed and downward when it is extended Normal response favours metabolic coma. (c) *Caloric stimulation*—In deep coma of whatever cause doll's head phenomenon can be difficult to elicit. In this case, the effects of caloric stimulation can be used. Ice-cold water is drawn up in a syringe and the external auditory meatus is irrigated with 20-40 ml After a brief delay, forced conjugate gaze occurs towards the irrigated ear Brain stem dysfunction may be revealed by a loss of gaze to one side (pontine lesion), or by failure of movements in the adducting eye (lesion in medial longitudinal bundle). (d) *Visual menace*—In the face of drowsiness a hemianopia may be detectable only by the response of a visual menace. (e) *Bobbing movements*—Vertical bobbing movements of the eye may be seen in pontine hemorrhage.

7. *Respiration*—(a) *Cheyne Stokes*—in bilateral hemispheric dysfunction or metabolic coma Irregularities of pattern other than Cheyne Stokes respiration are indicative of brainstem disorder. (b) *Central neurogenic hyperventilation* (sustained hyperpnoea)—suggest dysfunction at level of pons or midbrain (c) *Biot's or ataxic breathing* (irregular inspirations)—indicates dorsomedial medullary dysfunction. (d) *Acidotic respiration*—suggests diabetic ketoacidosis, uremia or other metabolic disorder. (e) *Depressed but regular breathing*—common in drug-induced coma. (f) *Apneustic breathing*—Pause at full inspiration, or more commonly brief end-respiratory pauses often alternating with expiratory pauses as well suggests damage to respiratory control mechanism located at mid- or caudal pontine level. (g) *Frothy sputum*—in organo-phosphorus poisoning.

8. *Neck*—for asymmetrical carotid pulses and bruit over the vessels. A stiff neck suggests meningeal irritation

9. *Face and mouth*—Suffusion of face in hypertension, alcoholism and sometimes in cerebral hemorrhage. Blowing out of one cheek and drooping of one corner of mouth indicate facial weakness. Tongue biting in epilepsy; pigmentation of tongue in Addison's disease, myxoedematous appearance of face in myxoedema.

## 4. ACUTE RENAL FAILURE (ARF)

**Causes:**

**Pre-renal:**

1. *Circulatory insufficiency*—Shock (cardiogenic, septicemic).
2. *Hypovolemia*—(a) secondary to surgical, traumatic or spontaneous bleeding, (b) burns, (c) acute hemolysis, or (d) poisoning.
3. *Electrolyte disorders*—Saline depletion, combined salt and water depletion, potassium deficiency or hypercalcemia (if circulatory disturbance or saline depletion are also present).

**Renal:**

1. *Acute tubular nephropathy*—most common condition usually due to ischemic (pre-renal) or toxic injury to kidneys.
   (i) *Nephrotoxins*—(a) heavy metals and their compounds—mercury, bismuth, arsenic, lead, cadmium, barium, gold, uranium. (b) Organic solvents—Carbon tetrachloride, tetrachlorethylene, trichloromethane, ethoxyethanol, chloroform, methanol, toluene. (c) Glycols—ethylene glycol, diethylene glycol, diglycolic acid, oxalic acid, propylene glycol. (d) Chemotherapeutic agents—kanamycin, gentamycin, polymyxin B, colistin, neomycin, bacitracin, amphotericin B, benzyl penicillin, methicillin, ampicillin, cephaloridine, rifampicin, sulphonamides, ethionamide, phenazopyridine. (e) Hemolytic agents—Sodium chlorate, potassium bromate, potassium chlorate, quinine, poisonous fungi, snake venom, cresol, aniline and other methemoglobulin producing agents. (f) Other drugs—Phenindione, phenylbutazone, acetazolamide, thiazides, radiographic contrast media, mannitol, dextran, phenacetin, paracetamol, barbiturates, glafenine, meprobamate colchicin, chelating agents such as desferal, sodium versenate, dimercaptol. (g) Miscellaneous—Carbon monoxide, phosphorus, pesticides, paraquat, lysol, phenols, diesel fuel, chlorinated hydrocarbons, methyldopa, acetic acid, tartaric acid, lithium salts, horse serum.

   (ii) *Intravascular hemolysis*—after blood transfusion, septic abortion or hemolytic drugs or poisons such as snake venom.

   (iii) *Shock*—Hemorrhagic or septic. Susceptibility to ARF is increased in pregnancy, obstructive jaundice, pan-

of common intoxicants Blood ketones and osmolality in certain circumstances. Blood smear for malarial parasites. Blood culture.

3. *C.S.F.*—for evidence of hemorrhage, meningitis or encephalitis. (Lumbar puncture may be deferred if a mass lesion is present.)

4. *Analysis of vomit or gastric lavage.*

D. X-RAYS—(1) *Of skull*—to demonstrate any fracture, to show condition of sella—erosion would suggest increased intracranial pressure; to show infection in sinuses, mastoids or petrous bones which may suggest intracranial infection; to demonstrate pineal shift which suggests a mass lesion. (2) *Of chest*—to show carcinoma (cerebral tumor), bronchiectasis, abscess or empyema (cerebral abscess), tuberculosis (meningitis) or mitral stenosis (cerebral embolism).

E. CEREBRAL ANGIOGRAPHY—Useful aid in brain tumor and subdural hematoma.

F. EEG—In comatose patients, where clinical examination has failed to localize the lesion, and EEG may localize it to one hemisphere. This is of particular value in cerebral abscess. An entirely normal EEG will make a supratentorial lesion unlikely. It may give evidence of a specific cause such as hepatic encephalopathy or herpes simplex encephalitis, or minor epileptic status.

G. ECHOENCEPHALOGRAPHY—useful adjunct when pineal is not calcified.

H. RADIO ISOTOPE BRAIN SCAN—useful for intracranial tumor.

I. THERAPEUTIC TEST—IV 50% glucose can be given as a therapeutic test in any case of unexplained coma or hemiparesis. where hypoglycemia is suspected.

**Differential Diagnosis of Coma:**

**Vascular causes:**

1. *Cerebral hemorrhage, thrombosis or embolism*—(See table on p. 525).

2. *Subarachnoid hemorrhage*—(i) Sudden intense headache. (ii) Meningeal signs and neck rigidity usually prominent. (iii) Focal neurological signs frequently absent but can occur and are usually due to intracerebral clot or infarction

plasma is greater than 20 : 1, a ratio below 14 : 1 is usually taken as indicating some impairment of renal function.

2. OLIGURIC STAGE—
   (a) *Oliguria*—(less than 400 ml. urine in 24 hours in adults) sets in in majority within 24-48 hours. The duration varies, average being 4-10 days. Complete anuria is rare and indicates either a severe renal catastrophe or obstructive etiology.
   (b) *Gastrointestinal*—Anorexia, nausea, vomiting; at times diarrhoea, mouth ulceration. Adynamic ileus or pseudo-peritonitis if these are related to uncontrolled uremia, they disappear after dialysis.
   (c) *Circulatory*—Hypertension is common in acute glomerulonephritis, renal infarct and cortical necrosis and when ARF results from intoxication by organic solvents. Severe hypertension is usual in malignant nephrosclerosis or thrombotic microangiopathy. Pericarditis is uncommon.
   (d) *Respiratory*—Dyspnoea is related to metabolic acidosis, to pulmonary infection or oedema.
   (e) *Neuromuscular*—Drowsiness, confusion and agitation occur in advanced uremia and may indicate water or drug intoxication. Convulsions, coma or focal neurological signs may also be observed. Muscular twitching or cramps are uncommon in absence of plasma electrolyte disorders.
   (f) *Infection*—Secondary sepsis is a major risk in patients with ARF.

**Biochemical disturbances**—1. *Nitrogen retention*—Blood urea rises rapidly during the first few days but the increase is not closely related with the clinical severity of uremia. 2. *Sodium*—Hyponatremia in common usually with hypochloremia. 3. *Potassium*—Hyperkalemia. Rarely hypokalemia due to loss of potassium by GI tract, alkalosis or dextrose-rich hyperalimentation. 4. *Bicarbonate*—Metabolic acidosis results from reduced secretion of hydrogen ions and accumulation of acid from increased protein breakdown. 5. *Calcium*—Moderate hypocalcemia is common but tetany is uncommon because of concomitant hypomagnesemia and acidosis which increase ionised calcium. 6. *Hematological disorders*—Anemia appears after several days of oliguria. Anemia at onset is due to hemorrhage or hemolysis.

| | *Cerebro-vascular accident* | *Diabetic coma* | *Uremia* |
|---|---|---|---|
| (1) Onset ... | Sudden | Gradual | Gradual |
| (2) Face ... | Flushed eyes deviated to one side. Facial paralysis | Flushed | Pallor |
| (3) Respiration | Slow and stertorous | Deep with signs of air hunger | Cheyne-Stokes |
| (4) Odour .. | Nil | Fruity | Ammoniacal |
| (5) Temperature . | Low grade fever | Subnormal | Variable |
| (6) Eye signs ... | Pupils normal, dilated or unequal | Soft eyeballs | Pupils may be inactive |
| (7) Other signs | Hemiplegia | Cold, dry skin | Muscular twitchings, hiccough, enlarged heart |

**Head injuries and their complications:**

1. *Brain trauma*—(i) History or evidence of head injury. (ii) Bleeding from nose, mouth or ears. (iii) Respiration rapid, irregular or Cheyne Stokes. (iv) Pulse rapid, later slow. (v) Pupils inactive, often unequal. (vi) Paralysis of cranial nerves. (vii) C.S F.—blood, with normal pressure.
2. *Chronic subdural hematoma*—(i) History of head injury followed weeks or months later by (ii) headache, nausea, vomiting and disturbances of vision. (iii) Headache of gradually increasing intensity. (iv) Mental symptoms (v) Weakness in extremities on one or both sides. (vi) Periods of unconsciousness. (vii) C S F—pressure increased, yellowish. (viii) Bilateral trephination of skull confirms diagnosis.

**Drugs and Poisons:**

*Alcoholic coma*—(i) Odour of alcohol in breath. (ii) Patient can usually be roused by stimulation. (iii) Congested eyes and hyperemia of face and neck. (iv) Pupils dilated and reacting. (v) Temperature sub-normal (vi) Slow and stertorous breathing.

*Opium*—(i) Odour in breath. (ii) Marked slowing of respiration (iii) Slow, feeble pulse. (iv) Cold and clammy skin. (v) Pin point pupils. (vi) No fever.

*Barbiturates*—(i) Drowsiness, mental confusion and headache precede coma. (ii) Shallow respiration. (iii) Temperature subnormal. (iv) Fall of blood pressure. (v) Pupils fixed and usually small, may dilate terminally.

orally for preventing fungal infection. (c) Bladder catheters should not be left in situ unless absolutely necessary. (d) Daily estimation of—body weight, urine output and fluid intake, blood urea, creatinine, total proteins, sodium, potassium, bicarbonate and hemoglobin. Measurements of arterial gases and pH may be necessary.

2. *Fluids*—Quantity equivalent to volume of urine passed plus gastrointestinal loss in previous 24 hours and another 400 ml. for insensible losses. An average weight loss of 0.2-0.5 kg./day should be obtained in these patients.

3. *Sodium*—With normal sodium levels, a diet supplying less than 30 mEq. (30 mmol.) of sodium/day is given during olguric phase. More severe restriction if oedema or hypertension.

4. *Potassium*—Hyperkalemia is the most dangerous complication of ARF. ECG changes are more reliable than plasma levels and consist of tall T waves, widening of QRS, prolonged PR interval and disappearance of P waves. The safest and quickest treatment is with 5% calcium gluconate 10 ml. IV. Potassium accumulation may be minimised by low potassium diet, treatment of infection, debridement of necrotic tissue, drainage of hematomas and high caloric intake.

5. *Treatment of acidosis*—Uremic acidosis is seen in its pure form in chronic glomerulonephritis or accelerated hypertension. Creatinine clearance below 10 ml./minute, with retention of urate, sulphate and phosphate. Uremic acidosis can be corrected by giving sodium bicarbonate or lactate but these patients have difficulty in excreting sodium and treatment with sodium salts easily precipitates pulmonary oedema. Hence one should treat this type of acidosis only after correction of saline excess and hypocalcemia.

6. *Nutrition*—An adequate caloric intake is needed to minimise endogenous protein catabolism and acidosis. (i) If ARF not severe—30 kcal/kg./day and 0.5 g./kg./day of protein (2,000 kcal and 30 g. protein/day for an adult). If anorexia is pronounced feeding can be done through a gastric tube. (ii) If ARF is severe—(e.g., post-traumatic or surgical), 50 kcal/kg./day and 1 g./kg./day of protein may be required to obtain a positive nitrogen balance. Since fluid must be restricted, parenteral fluid using dextrose-rich solutions and amino-acid mixtures is often indicated.

**Coma of endocrine origin:**

1. *Hypopituitarism*—Sudden onset if precipitated by infection. Usually female with changes of hypopituitarism. Low B.P. and low blood sugar.
2. *Myxoedema*—Characteristic appearance with slow pulse and subnormal temperature.
3. *Suprarenal cortical failure*—May occur suddenly as a result of stress e.g. operation in a patient known to be suffering from cortical deficiency. Low B.P. and electrolyte disturbances.

**Physical agents:**

1. *Heat hyperpyrexia and Sun stroke*—(i) Prolonged exposure to high temperature or to heat of sun. (ii) Suffused conjunctivae with contracted pupils. (iii) Hyperpyrexia. (iv) Absence of sweating and dry skin. (v) Circulatory collapse. (vi) Convulsions.
2. *Electric shock*—(i) History of being exposed to electric current. (ii) Evidence of skin burns.
3. *Severe fevers*—e.g. typhoid, typhus—(i) Insidious onset. (ii) Fever of a few days duration. (iii) Other features or typhoid state.

**Mental disorders:**

*Suggested by*—(i) History of psychological disturbance like hysteria, depressive state or schizophrenia. (ii) Usually occurs in presence of audience. (iii) Not true unconsciousness but severe state of stupor. (iv) Unusual attitudes. (v) Absence of physical signs. (vi) Fluttering of eyelids, resistance to opening and rolling upward of eyeballs.

**Psychogenic:**

In hysterical trance the patient, though apparently unconscious, usually shows some response to external stimuli. Rigidity of hysterical type may be present. Absence of signs of organic disease Jerky hyperventilation. Pupils normal.

**Terminal states:**

Coma carcinomatosum—A patient dying from visceral cancer may become comatose shortly before death.

**Management of coma:**

1. *Removal or control of cause*—e.g.—Gastric lavage and diuretics in narcotic poisoning; removal of patient to uncontaminated atmosphere and inhalation of oxygen and 5% carbon dioxide in carbon monoxide poisoning; ice

D **Management of diuretic phase—**

Fluid and electrolyte replacement during this stage must be based more on clinical observation such as general condition, pulse, blood pressure and thirst, and biochemical observations rather than on quantitative and qualitative loss of water and electrolytes in urine. Intravenous therapy is stopped and the patient encouraged to take a high potassium, high salt diet and liberal intake of water (about 3000 ml.). Infection remains a problem during this phase. Early ambulation and return to normal dietary habits should be allowed as soon as possible.

## 5. CHRONIC RENAL FAILURE (CRF)

**Causes:**

1. *Destructive lesions of kidneys*—Glomerulonephritis, subacute bacterial endocarditis, polyarteritis nodosa, disseminated lupus erythematosus, anaphylactoid purpura.
2. *Infections*—Chronic pyelonephritis, renal tuberculosis.
3. *Urinary tract obstruction*—Bilateral renal calculi, prostatic obstruction, urethral valves, retroperitoneal fibrosis.
4. *Hypertension*—Malignant and non-malignant.
5. *Congenital lesions*—Polycystic disease, Fanconi syndrome.
6. *Miscellaneous causes*—Diabetic nephropathy, chronic intermittent hemoglobinuria, gout, myelomatosis, irradiation of kidneys, phenacetin nephropathy, hypercalcemia, amyloid disease, renal vein thrombosis.

**Pathogenesis:** of clinical syndrome of CRF

1. *Uremic toxins*—Fall in glomerular filtration rate and reduction in renal tubular secretory capacity prevent certain substances from being excreted by the kidney and these probably produce their adverse effects on every organ of the body However studies of the effects of dialysis, dietary modifications and transplantation have not identified the toxins involved.
2. *Electrolyte and water excretion*—Limited ability of diseased kidney to manipulate electrolyte and water excretion appropriately may lead to either salt and water retention with oedema and circulatory congestion, or to salt depletion.
3. *Erythropoietin and 25-hydroxycholecalciferol*—There is impaired production of erythropoietin and reduced hydroxylation of 25-hydroxycholecalciferol to 1,25 dihydroxycholecalciferol, the most active metabolite of vitamin D, a step which normally occurs in the kidney.

(b) *Late*—Detected after 2 years of primary infection. May lead to G.P.I. CSF active with positive WR and paretic CGC.

Antisyphilitic therapy prevents development of symptomatic neurosyphilis in future.

## II. Meningovascular Neurosyphilis

**Cerebral:**

1. CEREBRAL VASCULAR—Characterised pathologically by endarteritis with thrombosis and encephalomalacia and clinically by various focal neurological signs such as hemiplegia and aphasia.

2. CEREBRAL MENINGEAL—
   - (a) *Diffuse cerebral meningeal neurosyphilis*—
     - (i) *Acute syphilitic meningitis*—(i) Acute onset. (ii) Symptoms of increased intracranial pressure—headache, nausea and vomiting. (iii) Evidence of meningeal irritation but Kernig's sign not usually pronounced. (iv) Cranial nerve palsies. (v) Fever. (vi) C.S.F.—1,000 to 1,500 cells, 30% or more polynuclears; Wassermann strongly positive.
     - (ii) *Chronic cerebral leptomeningitis*—(a) *Basal meningitis*—Cranial nerve involvement including optic nerves and chiasma. Hydrocephalus, hypothalamic disturbance may occur. (b) *Convexity meningitis*—results in headache, drowsiness and focal cortical symptoms including fits.
   - (b) *Focal cerebral meningeal neurosyphilis* (Gumma)—Signs of expanding intracranial lesion in patient with abnormalities in CSF characteristic of syphilis.

3. SYPHILITIC PRIMARY OPTIC ATROPHY—due to localised syphilitic meningitis. Types—(a) Progressive diminution of vision concentrically from periphery to centre. (b) Wedge-shaped projection. (c) Central visual loss with peripheral vision intact. This is uncommon and does not respond to antisyphilitic therapy.

4. SYPHILITIC DEMENTIA or pseudo-general paralysis—Symptoms closely resembling G P.I but cranial nerve paralysis and other indications of widespread lesion.

**Spinal:**

1. *Chronic meningomyelitis*—Initial symptoms due to meningitis—pain in the back, pain in root areas and paraesthe-

**Clinical features:** of advanced CRF

| System | Symptoms | Signs |
|---|---|---|
| *Genito-urinary* | Nocturia<br>Thirst | Proteinuria<br>Abnormal urinary sediment |
| *Cardio-vascular* | Fatigue<br>Dyspnoea<br>Orthopnoea<br>Chest pain<br>Oedema | Hypertension<br>Pericarditis<br>Circulatory overload<br>Blood volume depletion |
| *Gastro-intestinal* | Anorexia<br>Nausea<br>Vomiting<br>Hiccoughs<br>Diarrhoea | Foetor<br>Oral and buccal ulceration<br>Parotitis |
| *Neuro-muscular* | Cramps<br>Weakness<br>Drowsiness<br>Hallucinations<br>Fits<br>Stupor progressing to coma | Tremor<br>Flap (asterixis)<br>Hyper-reflexia going on to loss of tendon jerks<br>Loss of vibration sense and light touch |
| *Cutaneous* | Itching | Dry skin<br>Pigmentation<br>Scratch marks<br>White bands on nails |
| *Hematological* | Bruising<br>Epistaxis<br>Dyspnoea<br>Fatigue | Anemia<br>Bruises<br>Microangiopathic hemolytic anemia |
| *Ocular* | Sore eyes<br>Failing vision | Congested eyes<br>Corneal calcification<br>Retinopathy<br>Retinal detatchment |
| *Skeletal* | Bone pain | Deformities or rickets in children |

**Biochemical features:**

1. *Blood urea and creatinine*—levels always raised. However normal levels cannot be taken to indicate that renal function is not impaired. Serial estimations of plasma creatinine provide the best indication of the state of renal function in patients with CRF since creatinine production is independent of diet or rates of protein catabolism.

memory defect, impairment of judgement and lability of mood going on to imbecility. (b) Grandiose type—Sense of euphoria and expressions of delusions of grandeur.

3. *Terminal stage or period of decline*—Fits, sometimes with transient neurological deficits may accompany deterioration or occasionally herald it. Motor signs gradually appear until the 'insane' patient becomes gradually paralysed, mute and incontinent. Death from intercurrent infection is common.

SIGNS—(i) Pupillary abnormalities often of Argyll-Robertson type. (ii) Cranial nerves—Optic atrophy much less common than in tabes. Coarse tremors of facial, labial and tongue muscles. (iii) Slurred and tremulous speech and handwriting disorders in the form of micrographia and inability to write in straight line. (iv) Exaggerated deep reflexes, plantars extensor. (v) Tabes dorsalis may co-exist (Taboparesis).

*CSF*—Moderate pleocytosis, 15-100 cells per c mm., increased protein and usually first zone type colloid gold test.

**Tabes dorsalis**

CLINICAL FEATURES: *Basic lesion*—is in the root entry zone of the posterior nerve roots and there is ascending degeneration of the posterior columns, diagnostic features are referable to these.

1. *Subjective sensory disturbances*—(a) Pains—(i) typical lightning pains; (ii) fixed pains; (iii) girdle pains; (iv) pains of tabetic crisis. (b) Feeling of walking on cotton wool.
2. *Objective sensory loss*—Butterfly area on face, inner side of arms, saddle-shaped area round anus, feet. Anaesthesia of tendo Achilles (Abadie's sign).
3. *Hypotonia*—Abnormal active and passive movements of the limbs; "double jointed" man.
4. *Ataxia*—Inco-ordination, clumsiness of movements.
5. *Reflexes*—Early loss of ankle jerks; plantars always flexor unless complicated by G.P.I. (Taboparesis).
6. *Ocular signs*—Pupils usually contracted and irregular or unequal in size, sluggish reaction to light Argyll-Robertson pupil in late stages. Optic atrophy may be early; ptosis, transient paralysis of external ocular muscles, diplopia
7. *Sphincters*—Difficulty in micturition or incontinence or sometimes retention. Faecal incontinence may occur. Impotence sometimes an early symptom.
8. *Trophic changes*—(a) Perforating ulcer usually of pad of great toe. (b) Charcot's joints—arthropathies. (c) Brittleness of bones.

amino acids (including histidine), either as flavoured drink or tablets. (d) *Vitamins*—Viltamin B complex, vitamin C and folate.

2. TREATMENT OF HYPERKALEMIA—Emergency treatment is needed more often in acute renal failure. It may however be necessary in CRF. Emergency measures include IV calcium gluconate 10-20 ml of 10% solution with IV glucose 50 ml of 50% solution with 10 units of soluble insulin. These measures allow time to institute treatment for removing potassium from the body namely calcium resonium 15 g one to three times daily by mouth or 30 g as retention enema. Dietary potassium should be about 50 mEq (50 mmol/day) for most patients.

3. SALT AND WATER INTAKE—Salt overload and salt depletion are both hazards. The needs of each patient require individual assessment. Need for salt restriction is indicated by oedema and/or hypertension. Salt depletion should be suspected if B.P. is not raised and postural hypotension tends to occur.

4. DIURETICS—Large doses of Frusemide (250 mg-2 g in 24 hours) may promote diuresis even in advanced CRF

5. TREATMENT OF ASSOCIATED DISORDERS—
   (a) *Anemia*—Severe degrees of anemia are well tolerated by most patients and it is best to leave it untreated except for correction of obvious iron deficiency. Hemolysis can be prevented by keeping blood urea below 30 mmol/litre by diet or dialysis
   (b) *Renal osteodystrophy*—Secondary hyperparathyroidism and osteomalacia can be controlled by reduction of serum phosphate by diet and supplementation with calcium carbonate 1-3 g daily, and use of phosphate binding agents such as aluminium hydroxide, however its accumulation in the brain may cause dialysis dementia. Occasionally calcium supplements or vitamin D analogues such as 1,25 dihydroxycholecalciferol or 1 alpha hydroxycholecalciferol will be needed if low serum calcium levels or raised alkaline phosphate levels suggest that bone disease is progressing. Parathyroidectomy may be required in some patients in whom hypercalcemia and metastatic calcification are persistent problems.
   (c) *Hypertension*—should be effectively treated.

5. *Lumbar syringomyelia*—sensory dissociation, normal pupillary reflexes, negative serology.
6. *Tumor of cauda equina*—pains in legs or sacral region. Sphincter disturbances, absent reflexes, loss of sensation over legs Asymmetry of symptoms and signs, absence of Argyll-Robertson pupils and of ataxia.
7. *Disseminated sclerosis*—Reflexes usually hyperactive. Presence of cerebellar signs but negative blood and CSF serological tests.
8. *Holmes-Adie's syndrome*—Almost exclusively in females. Myotonic pupil with absent ankle and knee jerks

## IV. Congenital Neurosyphilis

CLINICAL FEATURES—and course similar to those seen after infection in later life. (a) Meningovascular disease is seen during first few years after birth. (b) GPI may occur during school years and present as simple deterioration in performance with fits. (c) Tabes is much less common and presents in adolescence or early adult life with sphincter dysfunction and visual failure or deafness, rarely with ataxia and lightning pains, and has a relatively benign course. Taboparesis may occur. (d) Isolated perceptive deafness may present in middle age.

LABORATORY DIAGNOSIS OF NEUROSYPHILIS :

*Blood serology*—In active neurosyphilis VDRL positive in about 75% and TPHA test and FTA-ABS test in nearly all cases. If blood tests are positive, disease activity should be further assessed by CSF examination

*CSF*—(a) *Serology*—Positive VDRL is more likely to indicate active disease than positive specific serology. (b) *Cell count and proteins*—Active neurosyphilis of any variety produces increase in mononuclear cells to about 200/mm$^3$, mainly lymphocytes and rise in protein to about 2g/litre. (c) *IgG*—Rise in IgG causes changes in colloidal gold curve in either paretic, tabetic or meningitic pattern. Electrophoresis often shows elevation of cathodal IgG which may be diffuse or banded.

**Treatment**: of neurosyphilis.

1. *Prednisolone*—40 mg daily for 3 days to prevent Herxheimer reaction (most likely to occur in GPI or when CSF cell count is raised). A longer course in optic atrophy may be helpful.
2. *Specific therapy*—600,000 units IM of aqueous procaine penicillin daily for 21 days, or Erythromycin or Tetra-

**Causes**—(a) Malignant hypertension. (b) Acute and chronic nephritis. (c) Eclampsia. (d) Pheochromocytoma. (e) Lead encephalopathy.

**Symptoms**—in the form of prodromes usually present. Increasingly severe headache, vomiting and apathy. Loss of appetite. Paraesthesias. Often oliguria before seizure. The child with acute nephritis may develop hypertensive encephalopathy with a rise in diastolic pressure to 110 mm., the adult may develop diastolic pressure of 150-180 mm. before features of encephalopathy supervene.

**Signs:**

1. *Due to cerebral disturbance*—Impairment of consciousness and convulsions. Minor seizures of few twitches in single muscle groups or severe attack with tonic and clonic convulsions. During tonic stage cessation of respiration leads to cyanosis and swelling of neck veins. The impending asphyxia is relieved by gasping respirations with the setting in of clonic stage. At times only twitching of face replaces tonic stage. Clonic spasms start in arm, face, or other muscle groups and then become generalised. Foaming at the mouth. Pupils dilated and reacting sluggishly. Control of sphincters usually lost. Convulsions last from few seconds to about 10 minutes. Repeated attacks may occur in a day. Usually coma precedes onset of convulsions or may be the sole manifestation of hypertensive encephalopathy. The patient is often pale and breathing less stertorous in contrast to apoplexy. Rigidity of neck frequent. Focal neurological signs such as cortical blindness, disturbance of speech, hemiplegia, extensor plantar response may occur. If lumbar puncture is done fluid gushes out in a stream.
2. *Evidence of severe hypertension*—(a) Diastolic pressure over 140 mm. Hg. (b) Papilloedema with retinal exudates and hemorrhages.
3. *Signs of cause of hypertension*—e.g., acute nephritis.

**Management:**

1. *Anticonvulsants*—Phenobarbitone 200 mg IM or Diazepam 2 5-10 mg. IM or IV repeated as necessary, or phenobarbitone 60 mg. t.d.s. and dilantin sodium 0 2 gm. t.d.s. administered through intragastric tube. IV sodium amylobarbitone or thiopentone may be required.
2. *Hypotensive drugs*—See p. 203. In presence of azotemia B P. should be reduced cautiously and preference should be given to drugs which do not reduce renal blood flow such as hydralazine, prazosin and diazoxide. In case of pheochromocytoma alpha-adrenergic blocking drug such as

canal. (d) Dislocated vertebra. (e) Thick transverse ridge of granulomatous tissue producing compression. (f) Spinal phlebitis resulting in venous infarction of the spinal cord.

*Clinical features*—Subacute or chronic onset of paraparesis or paraplegia which may be symmetrical or asymmetrical preceded or followed by root pains and paraesthesiae. Level of objective sensory loss. Sphincter involvement usually late. Spinal deformity (gibbus).

*Investigations*—(a) For confirmation of diagnosis of extramedullary compression—X-ray spine, and myelogram with routine CSF. (b) For confirming etiology—ESR, X-ray chest, histopathology of lesion.

*Management*—Immobilization, antituberculous chemotherapy Laminectomy and removal of granulomatous mass or aspiration of abscess.

4. **Arachnoiditis**—Chronic spinal meningitides due to inflammation of all three layers of spinal theca. May be of primary spinal variety, or secondary to vertebral caries or tuberculous basal meningitis.

*Clinical features*—(a) *Subacute form*—Maximal severity is reached within 2-5 days. Symptoms of root pains, paraesthesiae, paralysis, bladder disturbance, and wasting of muscles. General symptoms of low grade fever, malaise and anorexia. The disease may present as a single-level lesion resembling spinal tumor, or multifocal radiculopathy and/or myelopathy with or without vasculopathy, or an ascending variety with affection of lumbosacral roots and severe sciatica followed by an areflexic hypotonic limb and bladder paralysis, and sensory loss. Soon the sensory loss, root pains and paralysis ascend to involve all four limbs. (b) *Chronic form*—May progress slowly over months or years simulating a spinal tumor with lesion localised to a single level, or with multifocal spinal cord lesions.

*Investigations*—(a) *Plain x-ray of spine*—may show vertebral caries. (b) *CSF*—Typically there is lymphocytic proliferation with 50-100 cells/cmm, and marked rise in proteins even upto 2-3 gm/100 ml. (c) *Myelogram*—May show single level partial or total block, or there may not be obvious block but dye column is broken down and there may be globulation and flocculation.

*Management*—Antituberculous therapy, high doses of steroids with intrathecal steroid administration, and physiotherapy.

in loins and flanks. Smell of urine may be complained of or patient may notice hematuria. The frequency of micturition may be so severe that patient has to pass urine every half hour with severe pain accompanying the passage of urine.

(b) *In children*—The onset may be with fits and pyrexia with screaming on micturition in infants. In older children noctural enuresis often presenting symptom.

DIAGNOSIS—*Urine*—(a) *Routine examination*—may be frankly blood stained, more often cloudy due to large number of pus cells. Fishy odour, or ammoniacal if ammonia producing organism such as proteus is present. pH very high due to bacterial action producing ammonia. Pus cells, white cell casts, red cells, epithelial cells and organisms. (b) *Bacteriological examination*—Cleaning the genitals with suitable antiseptics and collection of a mid-stream specimen (MSU) is adequate for most bacteriological examinations. Significant infection is said to be present when bacterial count exceeds $10^3$/ml of freshly voided urine. False negative results may be due to—recent administration of antibiotic, diuresis and frequent voiding, contamination by bacterial cleansing agent, fastidious organisms, or deterioration of laboratory culture medium.

### Chronic pyelonephritis

Infection of more than 4 months' duration may be considered chronic.

CLINICAL PICTURE—

A. *In adults*—One of the following:
   1. *Typical history of recurrent urinary infections*—Recurrent fever, dysuria, loin pain, pyuria with positive urine culture. There may be obvious cause for the recurrent attacks such as renal tract obstruction, stone, hydronephrosis or indwelling catheter.
   2. *Hypertension*—may be a common accompaniment.
   3. *Renal failure*—of insidious onset may be the presenting feature. Because the process progresses very slowly the patient may present with renal osteomalacia or renal hyperparathyroidism.
   4. No symptoms but persistent proteinuria.

B. *In children*—Non-specific symptoms such as malaise, anorexia, jaundice, bed wetting, failure to thrive, gastrointestinal upsets, or recurrent fevers.

DIAGNOSIS—(i) *Proteinuria*—usually upto 3 gm./day, more if malignant hypertension or congestive heart failure. (ii) *Urinary*

FRONTAL LOBE—

(a) *Prefrontal*—(i) Precocious mental symptoms—alteration of character and temperament, disorientation, intellectual dullness, yawning, tendency to childish jocularity, deficient inhibition of emotional responses, euphoria, neglect of sphincters. (ii) Papilloedema and vomiting develop late and may be absent. (iii) Catatonia—Patient tends to become immobilised for some time in one attitude. (iv) Grasp reflex—Pathognomonic.

(b) *Post frontal*—In addition to above, unilateral fits and in left-sided tumors a degree of persistent motor aphasia, or fits commencing with or followed by attacks of transient motor aphasia.

(c) *Orbital surface tumor*—may be associated with ipsilateral anosmia, exophthalmos and primary ipsilateral optic atrophy.

PARIETAL LOBE—(i) Sensory loss of cortical type prominent, (ii) Sensory Jacksonian fits—Paraesthesiae beginning in that part of the body on the opposite side corresponding to the focus of excitation (iii) Hypotonia and sensory ataxia if post-central lesion. (iv) Neighbourhood symptoms—Thalamic over-action, homonymous defect of the visual fields. (v) Alexia or inability to read, and agraphia or loss of ability to express meanings in written languages if lesion of left angular gyrus.

TEMPORAL LOBE—(i) Uncinate fits—(a) Hallucinations of taste and smell, usually unpleasant (uncinate fits). (b) Dazed or dreamy appearance. (c) Involuntary licking or tasting movements. (ii) Visual defects—(a) Complex visual hallucinations. (b) Hemianopia in contralateral halves of visual fields. (iii) Neighbourhood symptoms—(a) Hemiplegic signs most marked in face, less in arm and least in leg. (b) Weakness of conjugate deviation of eyes to opposite side. (c) Miosis and ptosis in early stages, later signs of third nerve palsy. (d) Diminution of corneal reflex on affected side due to compression to trigeminal nerve. (iv) Aphasia may occur in left-sided temporal lobe tumors.

OCCIPITAL LOBE—(i) Signs of increased intracranial pressure conspicuous. (ii) Contralateral half-blindness or hemianopia; central vision usually escapes. (iii) Epileptiform convulsions common. (iv) Neighbourhood symptoms—Word deafness, impairment of taste and smell; and on the opposite

| *Drug* | *Dose* | *Remarks* |
|---|---|---|
| Sulphamethizole | 200 mg. 6 hourly. | |
| *Co-trimaxozole* | 2 tablets b d or 1 tablet b d. of DS | Useful in variety of infections. Useful for long term prophylaxis of UTI. Should not be used in pregnancy. |
| *Nitrofurantoin* | 100 mg t d s. after food. | Wide range of activity against both gram-positive and gram-negative bacteria. Effective against most strains of E. Coli In renal failure small doses may produce high levels and cause neuropathy. |
| *Methinamine mandelate* (Mandelamine) | 4-6g daily till urine is sterile then half initial dose Not indicated in acute infection. | Non-toxic. Drug fastness rarely develops Contraindicated in renal failure, and not advised in presence of urea splitting organisms e g. Proteus vulgaris. |
| *Nalidixic acid* (Negram) | 1g. 6-hourly by mouth | Useful against proteus, Klebsiella and some strains of E. Coli. Can be given in renal failure. |
| *Antibiotics:* | | |
| *Penicillin group* | | |
| Ampicillin | 400 mg. q.d s oral, IM/IV | Effective against Strep. faec., and Proteus. Danger of resistance |
| Amoxycillin | 250 mg t d s oral, IM/IV | |
| Talampicillin (Talpen) | | |
| *Tetracyclines* | 0.5g 6-hourly oral, IM or IV | Wide spectrum. Not to be used in renal failure |
| *Chloramphenicol* | | Same wide spectrum. Total dose should not exceed 25 g. Risk of marrow depression. |
| *Cephalosporins* | | |
| Cephalexin | 500 mg. q.d s oral | Active against E coli, staphylo, Proteus. Klebsiella and Strep faec. |
| Cephalothin | 1-3 g IM or IV every 6 hours | Nephrotoxic in doses over 4 g. per day Antibacterial spectrum similar to cephalexin. |
| Cephradine (Eskacef) | 500 mg. q.d s. oral or IM | Same antibacterial spectrum as Cephalexin |
| *Carbenicillin* | 5 g. daily in divided doses IM. | Use should be reserved for difficult group of organisms—Pseudomonas and Proteus. |

disturbances—Nystagmus and weakness of conjugate ocular deviation. (v) Tremors—on voluntary movement. (vi) Adiadokokinesis—Inability to carry out alternating movements with rapidity and regularity. (vii) Rebound phenomenon. (viii) Speech—jerky and explosive. (ix) Pendular knee jerk (x) Barany's pointing test—Mispointing the mark with closed eyes after having touched it with eyes open. Present only in the ipsilateral limb.

*Midline tumors*—(i) Common in children, short history. (ii) Symptoms of hypopituitarism. (iii) Tonic fits. (iv) Nystagmus rare

*Lateral lobe tumors*—(i) Suboccipital headache. (ii) Tendency to stagger towards side of lesion (iii) Nystagmus marked. (iv) Neighbourhood symptoms more conspicuous —cranial nerve palsies, pyramidal signs on opposite side of body.

AUDITORY NERVE TUMOR (Acoustic neuroma)—(i) Involvement of auditory nerve—(a) Cochlear division—impaired hearing, deafness, tinnitus. (b) Vestibular division—Vertigo. (ii) Headache—typically occipital. (iii) Cerebellar signs—Nystagmus, ataxia. (iv) Affection of other cranial nerves—(a) Trigeminal—Unilateral sensory impairment of face, loss of corneal reflex. (b) Facial—Slight unilateral weakness or twitching of facial muscles. (c) Abducent—Diplopia, weakness of lateral rectus muscle. (v) Evidence of increased intracranial pressure.

PINEAL BODY—(i) Signs of increased intracranial pressure. (ii) Signs of pressure upon neighbouring structures—signs of mid-brain lesion, bilateral signs of pyramidal lesion, nystagmus and ataxia, deafness and tremors (iii) Syndrome of paralysis of upward gaze with loss of pupillary light reflex characteristic of pineal tumors (iv) Rarely precocious puberty.

PITUITARY TUMOR—(i) Mechanical or pressure symptoms especially on the optic chiasma Basophilic tumors are rarely large enough to produce focal cerebral symptoms or any change in the size of the sella turcica. (ii) Endocrine or hormonal symptoms—Gigantism or acromegaly. (iii) Choking of optic disc rare. (iv) Proptosis with oedema of conjunctiva if tumor protrudes into cavernous sinus. (v) Symptoms of hypofunction of the pituitary when a major portion of the gland is destroyed.

## 8. POLYCYSTIC KIDNEYS

**Etiology:** Age—any age, but usually seen either under the age of 5 years or in adults between 30-50. Sex—equal incidence. Heredity—common. Associated anomalies—e.g., Spina bifida, undescending testicle, etc., indicate developmental disturbances, the cysts representing dilated segments of tubules or capsular spaces.

**Clinical features:**

*Onset* of symptoms may be dated from—(i) Demonstration of palpable kidney. (ii) Infection developing in a cyst and causing symptoms of pyelonephritis. (iii) Hematuria. (iv) Proteinuria. (v) Symptoms of renal insufficiency. (vi) Bilateral cystic disease in infant with associated anomalies.

CLINICAL TYPES—

1. *The latent type*—No symptoms. Kidney tumors found accidentally during a routine abdominal examination; or kidneys may not be palpable before onset of symptoms and the disease discovered by an abnormal pyelogram.
2. *The surgical type*—Local renal symptoms—(a) Of unilateral renal disease. Dull aching pain in loin, palpable kidney with localised tenderness, fever and leucocytosis or attack of hematuria with pain resembling renal colic. (b) Both kidneys palpable make the diagnosis clear.
3. *The medical type*—Insidious onset of symptoms of renal insufficiency such as loss of appetite, nausea, vomiting, constipation or diarrhoea, anemia or weakness, the clinical picture being often similar to that of chronic glomerulonephritis over a number of years. An intercurrent renal disease or other infection may be sufficient to precipitate onset of uremic symptoms.

Death usually due to uremia, but may occur from infection of cysts.

**Diagnosis:**

1. Kidneys—Marked bilateral enlargement is practically never due to any other condition.
2. Blood pressure—may be elevated.
3. Urine—Polyuria may be present in some. Albumin trace or large amount. Intermittent hematuria. Hyaline and granular casts occasional.

Headache at first paroxysmal, later constant with intense exacerbations; cranial nerve palsies common.

Ventriculograms show enormous dilatation of the ventricular system.

3. *Malignant hypertension*—Severe headache and papilloedema with perhaps a focal cerebral lesion. B. P. high, hemorrhages and cotton wool patches in retina; enlargement of heart, progressive, and evidence of renal insufficiency.

4. *Neurosyphilis*—(a) Meningo-vascular—Cranial nerve palsies, pupillary changes, positive VDRL reaction and characteristic C.S.F. changes. (b) Cerebral gumma—very rare; response to antisyphilitic therapy.

5. *Intracranial aneurysm*—(a) Before rupture—Symptoms due to pressure on surrounding structures but very slowly progressive, headache slight, no papilloedema. Angiography to confirm diagnosis. (b) After rupture—Headache, secondary optic atrophy and sometimes focal cerebral symptoms. History of acute episode.

6. *Subdural hematoma*—Symptoms and signs fall into 3 groups—
   - (a) *Due to general increase in pressure*—Headache, nausea, vomiting, dizziness, convulsions.
   - (b) *Due to fluctuation in volume of contents of hematoma*—State of consciousness varies from lapse of memory to aberrations of behaviour or coma. Semicomatose or mental stupor may develop in a few days or few hours.
   - (c) *Due to local pressure on adjacent structures*—Diplopia, ocular palsy, hemiparesis and Jacksonian epilepsy may occur.

   Diagnosis can be confirmed by angiogram and pneumoencephalogram.

7. *Benign intracranial hypertension*—Rare condition in which the intracranial pressure is raised in the absence of a tumor. Papilloedema and sixth nerve palsy may occur. The condition is self-limiting Conditions associated may be sudden reduction or increase in corticosteroid dosage, Addison's disease, hypoparathyroidism, pregnancy and obesity, previous head injury, sagittal sinus thrombosis, polycythemia, oral contraceptives.

8. *Cerebral cysticercosis*—(i) Epileptic fits. (ii) Palpable subcuticular cysts in muscles or subcutaneous tissues (iii) Eosinophilia.

9. *Arachnoiditis*—may follow acute lymphocytic choriomeningitis Localised cystic collections of C S F. in the subarachnoid space causing obstructive hydrocephalus May be indistinguishable from

3. Infarction—Subacute bacterial endocarditis.
4. Hemostatic deficiencies, leukemias, thrombocytopenic purpura, hemophilia, sickle-cell disease.
5. Vitamin deficiencies—Scurvy, liver disease.
6. Aneurysm of renal artery.
7. Exercise.
8. Collagen diseases—Disseminated lupus erythematosus, polyarteritis nodosa.

*Important causes of hematuria are*—Papilloma, carcinoma, tuberculosis, stone.

**Investigation of a case of hematuria:**

**History—**

1. *Age*—Newborn—hemorrhagic disease due to deficiency of vitamin K. Child—Acute nephritis, acute leukemia, acute infectious fevers, scurvy, hemophilia, bladder stone, meatal ulcer. Young adults—Renal calculus or tuberculosis, gonococcal urethritis. Middle or old age—Bladder tumors, congenital cystic kidneys, calculus, hypernephroma and other malignant tumors, hypertension, enlarged prostate.
2. *Sex*—Bladder stone almost always in males.
3. *Family history*—of polycystic kidneys or urinary calculi.
4. *Drugs*—History of taking anticoagulants, sulphonamides or large doses of aspirin.
5. *Previous history*—of pulmonary or bone and joint tuberculosis.
6. *Quantity of blood*—Profuse in tumors of kidney or bladder injury with rupture of kidney. Rarely tuberculosis and enlarged prostate.
7. *Precipitating cause*—Trauma. Jolting or exercise in renal calculus. Instrumentation. Intercourse.
8. *Timing of bleeding in relation to urinary stream*—Terminal hematuria preceded by clear urine suggests source in bladder, initial hematuria followed by clear urine is indicative usually of lesion in urethra. Hematuria equally distributed throughout the urinary flow is characteristic of renal and ureteric lesions, but may occur in bleeding from the bladder.
9. *Pain*—(i) Colicky in stone. (ii) Loin pain suggests renal cause. (iii) Pain at tip of penis especially after micturition indicates irritation of trigone. ((iv) Pain in perineal area —malignant disease of bladder or prostate. (v) Hypogastric pain in cystitis. (vi) In Dietl's crisis, severe pain but

7. *Radiation myelopathy.*

*Common causes of spastic paraplegia are*—(i) Transverse myelitis. (ii) Spinal cord compression including tuberculosis of spine. (iii) Anterior spinal artery occlusion. (iv) Trauma to spine. (v) Syphilitic meningomyelitis.

II **Due to lower motor neurone lesion:**

1. *Anterior horn cell*—Poliomyelitis.
2. *Peripheral nerve*—Peripheral neuritis, acute infective polyneuritis.
3. *Myoneural junction*—Myasthenia gravis, familial periodic paralysis.
4. *Muscles*—Myopathies.

## Investigation of a case of paraplegia:

A. Is THE PARAPLEGIA HYSTERICAL OR ORGANIC?

*Hysterical paraplegia*—

1. Plantar response never extensor.
2. No correlation between distribution of sensory loss and known anatomical distribution, or glove and stocking type of anaesthesia. Bilateral anaesthesia rare. Patient does not burn or cut the anaesthetic skin.
3. Motor power may be normal when recumbent, yet patient cannot stand (astasia abasia).
4. Hysterical rigidity—Rigidity shows variation from moment to moment.
5. Reflexes normal or exaggerated.
6. No sphincter disturbances.

B. Is IT UPPER MOTOR OR LOWER MOTOR NEURONE PARALYSIS?

| *UMN lesion* | *LMN lesion* |
|---|---|
| Paresis of movement | Paralysis of individual muscles or muscle groups |
| Diffuse distribution | Distribution confined to individual muscles |
| Spasticity | Flaccidity |
| No muscular wasting | Muscular atrophy |
| Tendon reflexes increased | Tendon reflexes absent or diminished |
| Extensor plantar response | Flexor plantar response |
| Associated involuntary movements | No associated involuntary movements |
| Electrical reaction normal | Reaction of degeneration |

2. *Blood examination*—for evidence of hypoprothrombinemia, purpura or hemophilia.
3. *Intravenous urography* (IVU)—may provide evidence of silent cysts or renal tumors. Appearance suggesting papillary necrosis indicates analgesic nephropathy but may occur in diabetes, sickle-cell disease or obstructive uropathy.
4. *Chest X-ray*—for evidence of malignancy or tuberculosis.
5. *Renal angiography*—If IVU is negative and bleeding seems to have originated in kidney. Selective catheterization of renal artery and injection of contrast medium into the vessel leads to greatly improved visualization of the smaller intra-renal arterioles. This selective technique is of most value in differential diagnosis of renal masses.
6. *Cystoscopy*—should be performed when IVU and urine culture are normal. Upper urinary tract bleeding is usually unilateral. Bladder tumors and pre-malignant papillomata can be diagnosed by cystoscopy, with biopsy when necessary.
7. *Additional investigations*—
   (a) *Retrograde pyelography*—may be necessary to outline a space-occupying lesion in kidney or renal pelvis, especially when the kidney shows no function on IV pyelography.
   (b) *Serum calcium and phosphorus*—to exclude hyperparathyroidism with urinary calculi.
   (c) *Serum acid phosphatase*—Elevated in carcinoma of prostate associated with metastases.
   (d) *Prostatic biopsy*—when prostatic carcinoma is suspected.
   (e) *Prostatic exfoliative cytology*—Examination of prostatic fluid obtained by prostatic massage may show malignant cells.
   (f) *Renal arteriography*—when there is doubt as to the nature of a space-occupying lesion.
   (g) *Renal biopsy*—in patients with recurrent hematuria in whom IVU and cystoscopy are normal and urine shows proteinuria, red cell casts and impaired renal function and raised serum IgA concentration.

## 10. RENAL FUNCTION TESTS

**Tests of glomerular function**—The process of glomerular filtration is impaired in any condition leading to: (i) renal circulatory

(c) *Progress of symptoms*—Frequent arrests in multiple sclerosis and syringomyelia. Rapid progress in malignant deposits.

(d) *Psychological symptoms*—Euphoria common in disseminated sclerosis. Mental symptoms in subacute combined degeneration and GPI. Mental deficiency in cerebral diplegia.

(e) *Fever*—may be present with tuberculosis of spine.

II. **Physical examination**—

1. *Speech*—Staccato speech in multiple sclerosis; dysarthria in amyotrophic lateral sclerosis and syringomyelia.
2. *Cranial nerves*—Paralysis in intracranial tumors. Nystagmus in multiple sclerosis. Pupillary changes in neurosyphilis. Inability to swallow in amyotrophic lateral sclerosis.
3. *Motor system*—

(a) *Wasting*—in presence of increased jerks suggestive of amyotrophic lateral sclerosis. Combination of upper motor paralysis in lower extremities and lower motor in upper extremities in (i) amyotrophic lateral sclerosis, (ii) syringomyelia, (iii) hematomyelia, (iv) hypertrophic cervical pachymeningitis, and (v) compression of cervical region by tumor or cervical disc degeneration, (vi) multiple sclerosis, (vii) nutritional deficiencies.

(b) *Co-ordination*—Ataxia combined with spasticity occurs in early stage of subacute combined degeneration and in disseminated sclerosis.

(c) *Involuntary movements*—Tremors in disseminated sclerosis. Muscular fasciculations in amyotrophic lateral sclerosis, and syringomyelia Choreoathetoid movements in cerebral diplegia.

4. *Sensory system*—

(a) *Dissociated anaesthesia*—A lesion in the centre of the cord, e.g., syringomyelia, hematomyelia, intramedullary tumor, anterior spinal artery thrombosis or hemorrhage.

(b) *Total loss of all forms of sensation*—below the segmental level in the trunk at which the transection takes place. Often there is a zone of hyperaesthesia in the skin area supplied by the segment of the spinal cord immediately above the lesion. Only complete cord lesions produce loss of light touch.

value is limited in early renal failure like urea when marked reduction of GFR may be associated with little change in serum creatinine. It is more useful in chronic renal disease and is particularly valuable in following progress of the disease. Simultaneous measurement of urea and creatinine levels offers more information and usually urea level is about 10 times greater than serum creatinine level. A lower ratio is associated with severe disease or low protein diet. A higher ratio reflects excessive nitrogen intake, hypercatabolic state, upper gastointestinal hemorrhage and acute renal failure.

4. MEASUREMENT OF GLOMERULAR FILTRATION RATE—

(a) *Urea clearance*—The clearance of a substance means the minimum volume of blood which contains the amount of the substance excreted in one minute. The test is based on the relation of blood-urea concentration to the urea excretion in the urine.

It is calculated by the formula $\frac{U \times V}{P}$ where U = concentration of urea in urine (mg./100 ml.), V = urine formed per minute (ml./minute), P = concentration of urea in plasma (mg./100 ml.).

*Interpretation*—Normal values—Average maximum urea clearance 75 ml. per minute. If the clearance is 40 to 60% of normal there is mild impairment, 20 to 40% moderate impairment and below 20% severe impairment of renal function.

(b) *Creatinine clearance*—should be measured if calculation of GFR from serum creatinine is likely to be erroneous (wasting, obesity, pregnancy or oedema). It is best performed on two consecutive 24-hour urine collections and a single blood sample between them. The endogenous creatinine clearance is 97-140 ml. per minute in men, and 85-125 ml. per minute in women. Unlike urea, creatinine clearance is not dependent on urine flow and because there are few variables it is more accurate than urea clearance. The mean of simultaneously deter-

rotation of neck in chronic progressive myelopathy complicating cranio-vertebral anomaly. (vii) Lhermitte's sign —may be positive in multiple sclerosis, craniovertebral anomaly, cervical spondylosis or cervical cord injuries, and subacute combined degeneration. The patient complains of sudden, transient, electric shock feeling spreading down the body when he flexes the head forward. (viii) Pes cavus in Friedreich's ataxia and familial spatic paraplegia. (ix) Mottling of teeth in fluorosis.

III. **Investigations**—

1. *C S.F.*—Routine, serological tests and colloidal gold curve for diagnosis of spinal syphilis. *Froin's syndrome*—In spinal tumor—(a) Xanthochromic fluid. (b) Increase in proteins as a result of which the fluid may coagulate spontaneously. (c) Slight or no increase of cells.
2. *Radiography*—
   (a) *Plain X-Ray of vertebral column*—Changes of T.B. spine, herniated intervertebral disc, secondary deposits, fracture dislocation. In spinal tumor increase of distance between pedicles or erosion of vertebra X-rays of cervical spine for spondylosis and for dislocation of atlanto-axial joints. Osteosclerosis in fluorosis.

   (b) *Tomograms*—useful for dorsal spine. Antero-posterior views useful for pedicle erosions, lateral views for calcification in disc protrusion.

   (c) *Myelography*—to confirm spinal block. In cervical spondylosis its value is limited.

   (d) *X-Ray skull*—Diagnosis of intracranial tumor and hydrocephalus.

   (e) *Cerebral arteriography*—if suspicion of expanding mass or vascular abnormality.

   (f) *Spinal angiography*—Every aortic radicular vessel on each side is injected to delineate spinal vasculature It is useful for intramedullary vascular tumors, but is somewhat hazardous
3. *Blood*—(i) Megaloblastic anemia in subacute combined degeneration. (ii) VDRL positive in spinal syphilis.
4. *Gastric analysis*—Pentagastrin-fast achlorhydria in subacute combined degeneration.
5. *Fundus*—Papilloedema in intracranial tumor. Temporal pallor in disseminated sclerosis.
6. *Urine*—for fluorine estimation in endemic fluorosis.

**Tests of endocrine functions of the kidney—**

Measurement of plasma renin 1,25-dihydroxycholecalciferol, erythropoietin and prostaglandins can be studied where facilities are available.

**Radioistope studies:** Two types of study are used for investigating renal function—

1. *Simple renography*—Detectors are positioned over the kidneys after injection of, for example, iodine-131 labelled hippuran. This type of study is used to show whether there is asymmetrical renal function.
2. *Gamma camera studies*—The principal use of the gamma camera is to provide information about renal function by recording serial images of both kidneys after the injection of a compound such as technetium-99m-DTPA. The main role of such studies is in assessing the contribution of each kidney to total renal function It is also possible to assess the relative function of a part of one kidney. Serial studies can be of great value in observing changes in function as a result of obstruction or following surgery or in transplanted kidneys.

## 11. RENAL BIOPSY

**Indications**—1. *Diagnosis*—(a) Proteinuria of more than 1.0 g/24 hours. (b) Unexplained renal failure in a patient with normal sized kidneys. (c) Hematuria not due to lower urinary tract lesion in a patient with normal IVU. (d) Diagnosis of rare renal diseases such as thrombotic thrombocytopenic purpura, Goodpasture's disease and Wegener's granulomatosis. 2. *To determine prognosis*—e.g. in nephrosis, and to follow progress of lesion and response to treatment. 3. *To follow rejection response*—in a transplanted kidney.

**Contraindications**—1. *Absolute*—(a) Single kidney, or severe malfunction of one kidney. (b) Bleeding diathesis (c) Presence of hypernephroma, large renal cyst, perinephric abscess, hydro- or pyo-nephrosis, hemangioma. (d) Unco-operative patient. 2. *Relative*—Malignant hypertension, toxemia of pregnancy, unusual difficulty in doing biopsy due to obesity or anasarca.

**Preparation of patient**—Patient's blood pressure should be controlled. The platelet count and coagulation should be normal and the blood group should be identified. An IVU should be done to ensure kidneys of normal or increased size without local disease such as scar.

**Procedure—**

*Needles*—The modified Vim-Silverman needle can be used. This has an exploring needle with an obturator which can be removed so that the cutting needle can be advanced down the lumen of the exploring needle. The cutting needle has two blades. The Menghini needle can also be used The Travenol Tru-Cut disposable needle is used only once; both the exploring and cutting function are performed by one needle.

signs—Absent abdominal reflexes, extensor plantars. (v) Posterior column involvement—Loss of tendon reflexes. (vi) Deformities—Pes cavus and scoliosis.

8. *Peroneal muscular atrophy*—(i) Usually young adults. (ii) Muscular wasting in lower limbs; muscles involved transversely (fat bottle or inverted champagne bottle appearance). (iii) High steppage gait and clubbed feet.
9. *Hysterical*—(i) Paralysis generally preceded by pain or discomfort in the limbs. (ii) Muscular wasting may occur after some time due to disuse. (iii) Stocking type of anaesthesia common. (iv) Patient can often move legs normally when lying or sitting, but collapses at once when he tries to stand or walk (astasia abasia).
10. *Distal myopathy of Welander*—Very rare. Slowly progressive, predominantly distal wasting and weakness.

## COMPRESSION OF THE SPINAL CORD

**Causes:**

1. DISEASE OF THE VERTEBRAL COLUMN—

   (a) *Degenerative*—Cervical spondylosis and myelopathy, thoracic disc, lumbar spondylosis, osteoporotic vertebral collapse. (b) *Traumatic.* (c) *Inflammatory*—Pott's disease, ankylosing spondylitis, atlanto-axial dislocation in rheumatoid arthritis. (d) *Neoplastic*—Secondary deposits, myeloma, primary tumors of bone. (e) *Congenital*—Craniocervical anomalies, achondroplasia, dysraphism.
2. INTRASPINAL EXTRAMEDULLARY LESIONS—(a) *Neoplasma*—Meningioma, neurofibroma, secondary deposits, arachnoid cysts. (b) *Inflammatory*—Tuberculous meningitis, arachnoiditis, epidural abscess.
3. INTRAMEDULLARY LESIONS—(a) *Congenital*—Syringomyelia. (b) *Tumor*—Glioma, ependymoma, medulloblastoma. (c) *Vascular*—A-V malformation.

**Symptoms:**

1. *Cord symptoms*—

   (a) *Pyramidal tract symptoms*—Spastic paralysis with exaggeration of tendon reflexes, absent abdominal and cremasteric reflexes, extensor plantars on one or both sides, and affection of sphincters.

   (b) *Long sensory tract symptoms*—(i) In complete transverse lesion, all forms of sensations are abolished

# 8. Infectious Diseases

## 1. DIPHTHERIA

**Etiology**—*Age*—Maximum incidence betweeen 2-5 years. *Mode of spread*—Droplet infection due to contact with person with active disease or more often with a carrier of virulent organisms. Chronic sinusitis and diseased tonsils important predisposing factors. *Types of C. diphtheriae*—Three strains gravis, intermediate, and mitis can be identified which are usually related to the clinical severity of the disease. The other factors which determine the severity of disease are host-resistance, site of infection and length of time elapsing before starting treatment.

*Incubation period*—2 to 6 days.

**Clinical types :**

1. RESPIRATORY GROUP—includes majority.

**Anterior nasal diphtheria**—Unilateral or bilateral nasal discharge, at first serous and often blood stained; later thick, mucopurulent and foul smelling. Thick membrane may be visible on the mucosa of the anterior part of nasal septum. Redness, excoriation, small follicular spots or pustules commonly present on upper lip round the nose. Constitutional symptoms slight or absent.

**Tonsillar diphtheria**—Commonest site of infection involving tonsils and/or pillars of fauces, with slight to moderate toxemia. Onset insidious, young patients usually do not complain of sore throat, there may be excessive salivation The *membrane* thin and glistening white in early stages becomes *thick* and opaque later; it is adherent, hence bleeds on forcible removal The edge of the membrane is well demarcated and bordered by a narrow band of inflammation. The rest of the throat appears normal. Pyrexia seldom exceeds 38.5°C. Pallor and listlessness are the main features.

**Pharyngeal diphtheria**—Toxin is readily absorbed from the pharynx and the membrane spreads rapidly. The membrane extends from the tonsils to the uvula, round the palate to the pharyngeal wall and into the nasopharynx where it may cause nasal obstruction. Anteriorly it may spread from soft to hard palate. Initially, it has a thin, slightly transparent appearance but soon becomes thick and well defined.

3. *Reflexes*—Deep reflexes below the level of the lesion are exaggerated, and those corresponding to the level of lesion lost, e.g., lesion of C5/6 cervical will cause loss of biceps and supinator jerks but exaggeration of triceps (inverted radial reflex).
4. *Autonomic symptoms*—Excessive sweating may occur on the parts of the body below the level of lesion.
5. *Radiography*—(i) *Plain X-ray*—in spinal tumor may show any of the following—(a) Localised destruction of the vertebra or vertebrae. (b) Changes in contour of or separation of pedicles. (c) Distortion of paraspinal tissues by tumors (frequently neurofibroma) which extend through the inter-vertebral foramen. (d) Proliferation of bone—rare except in osteomas and sarcomas, occasionally in hemangioma. (e) Presence of calcification occasionally in meningiomas. (ii) *Myelography*—for localising the lesions compressing the spinal cord.
6. *Lumbar puncture*—In spinal block, changes in C.S.F. below level of lesion. Root pains may be exacerbated following lumbar puncture, and thus help to localise the level.

| *Cord segment* | *Clinical features* | *Muscles paralysed* | *Reflexes* |
|---|---|---|---|
| C 3-4 | Pain in neck and occiput Pain, paraesthesia and weakness in upper limbs early Relative anaesthesia of face Paralysis of 9th, 10th and 11th cranial nerves Quadriplegia. | Lower part of trapezius, supraspinati and infraspinati Muscles of upper limbs Diaphragm. | ... |
| C 5 | Quadriplegia. | Deltoid, biceps, brachialis, rhomboids and supinator | Biceps (C5-6) and Supinator (C5-6) diminished or lost. Inversion of the radial reflex. Triceps ++ |
| C 7 | Paraplegia. | Triceps and extensors of wrist and fingers | Triceps (C6-7) lost |
| C 8-D1 | Spastic paralysis of trunk and lower limbs Paralysis of ocular sympathetic sometimes | Flexors of wrist and fingers and small muscles of hand | Tendon reflexes in upper limbs normal, in lower limbs exaggerated. |

| *Paralysis* | *Time of onset* | *Signs* |
|---|---|---|
| *Muscles of neck and trunk* | 5th-6th week | Falling back of the head. Inability to sit up if back muscles involved. |
| *Bulbar centres— Pharynx Larynx* | 7th week | Nasal voice, regurgitation of fluids, impaired deglutition, accumulation of secretions. Aphonia, hollow cough. |
| *Diaphragm (Phrenic nerve)* | | Cough, dyspnoea and thoracic breathing. Upper abdominal wall instead of rising with inspiration is immobile or falls in Paradoxical movements of diaphragm on fluoroscopy. |
| *Heart (Vagus nerve)* | | Tachycardia, rarely ectopic beats |
| *Muscles of limbs* ... | 7th-9th week | Wasting and weakness of muscles of extremities, loss of deep jerks and ataxia. |

4. RESPIRATORY—Bronchopneumonia, and pulmonary collapse especially in laryngotracheal lesions.
5. RENAL—Albuminuria and nephritis.
6. VASCULAR—Hemiplegia or monoplegia.

**Diagnosis:**

1. *Nasopharyngeal or laryngeal swab*—(a) Direct smear. (b) Culture.
2. *Therapeutic test*—If adequate dose of serum is given, diphtheritic membrane ceases to spread in 12-24 hours and separates in 3-4 days.

**Differential Diagnosis:**

**Faucial diphtheria—**

1. *Acute follicular tonsillitis*—

| *Diphtheria* | *Follicular tonsillitis* |
|---|---|
| History of epidemic, or of exposure. | History of previous attacks. |
| Insidious onset. | Acute onset. |
| Tough, ashy-grey uniform deposit. | Soft, yellowish white deposits in spots or patches with intervening areas of redness. |
| Membrane very adherent, bleeding points when torn off | Membrane easily removed leaving smooth surface. |

**Relation of source of compression to cord:**

1. VERTEBRAL CAUSES—
   (a) *T.B. spine*—Onset of cord symptoms usually late. Deformity, pain, tenderness and rigidity. Increased knee jerk early sign, followed by weakness of legs. Root symptoms rarely severe, often absent.
   (b) *Tumors of vertebrae*—Root symptoms early and marked and become exaggerated on slightest movement. Severe pain and tenderness over affected vertebrae. Deformity less angular than in caries. Cord symptoms often absent. Rapid emaciation.
2. INTRASPINAL TUMORS

| *Extramedullary intradural* | *Intramedullary (Intrinsic lesions of spinal cord)* |
| --- | --- |
| Radicular pains common. | Radicular pains rare. |
| Paraesthesia rare until late. | Paraesthesia occur in all stages. |
| Muscle fasciculations rare. | Muscle fasciculations common. |
| No dissociated loss of sensibility. | Dissociation of sensations common. |
| Bladder and rectal disturbances late. | Bladder and rectal disturbances early. |
| Rising level of sensory disturbances as peripheral tracts more affected. | Descending level of sensory disturbances. |
| No sacral sparing. | Sacral sparing. |
| Brown-Sequard syndrome may occur. | Persistent Brown-Sequard syndrome very rare. |
| Spasticity and other pyramidal signs pronounced. | Spasticity less pronounced. |
| Little or no muscle atrophy. | Characterised by normal muscle atrophy. |
| Trophic skin changes absent | Trophic skin changes common |
| Vertebral column may be sensitive to local pressure | No local tenderness of spine. |
| Spinal fluid changes frequent. | Spinal fluid changes rare. |

symptoms followed by cough, reluctance to feed and rapid wheezing respirations. Short inspiratory gasps may be accompanied by widespread crepitations.

4. *Staphylococcal pneumonia*—Onset with upper respiratory symptoms with rapid deterioration, dyspnoea, pallor and grunting respirations. Signs of localised consolidation.
5. *Asthma in first attack*—Usual age 9 months onwards. Expiratory distress, no stridor. Rhonchi with expiratory spasm.
6. *Laryngismus stridulus*—Sudden onset, recurrent nocturnal attacks of dyspnoea, no membrane, few general symptoms. Rickets or other evidence of tetany.
7. *Congenital laryngeal stridor*—Starts in first week, lasts upto two years. Obstructive signs but no dyspnoea; symptoms constant but less at night; sometimes abnormalities of jaw and chest.
8. *Papilloma of larynx*—Gradual onset, chronic cough and alteration of voice, slowly progressive dyspnoea with occasional paroxysms, stridulous breathing chiefly inspiratory; direct laryngoscopy shows tumor.
9. *Acute oedema of glottis*—Abrupt onset, persistent dyspnoea, history of nephritis or angio-neurotic oedema, etc. Oedema on laryngoscopy.
10. *Foreign body in larynx*—Acute onset with violent paroxysms of coughing; dyspnoea persistent, may abate after onset to return later; stridulous breathing chiefly inspiratory. Foreign body seen on laryngoscopy or X-ray.

**Prognosis**—(a) Age—In young infants mortality is higher owing to frequency of laryngeal involvement and bronchopneumonia. (b) Stage of disease on which antitoxin is first given. (c) Virulence of organism, location and extent of membrane and presence of faucial and palatal oedema, extensive glandular swelling, hemorrhages. (d) Reaction to antitoxin—malignant cases are very slow to respond to specific treatment. (e) Visceral changes—Prognosis should be guarded during first fortnight as cardiac failure may occur. (f) Paralysis—of pharynx, diaphragm, and hemiplegia are dangerous. (g) Prognosis grave if hemorrhage.

**Management of diphtheria:**

1. *General care*—(a) Complete rest in bed for 2 weeks, or longer if necessary. Convalescence not to be hurried. (b) Diet—Fluids in acute phase; soft or semisolid diet in early convalescence. (c) Glucose—IV to counteract hypoglycemia associated with toxemia. (d) Relief of sore throat

2. *Dorsal*—Commonest form. Symptoms same as cervical but no involvement of arms. Priapism common. Girdle pain and hyperaesthetic zone between ensiform cartilage and pubes. Retention or intermittent incontinence of urine.
3. *Lumbar cord and conus*—Paralysis of legs partly of upper and mainly of lower motor neurone; knee jerks absent (upper lumbar segment involved). Plantar reflex almost always abolished. Incontinence of urine and faeces. No priapism.

COURSE—

*Paraplegia in extension*—In acute myelitis at the onset, all the reflexes are lost below the level of the lesion—stage of flaccidity or spinal shock. After about 3 weeks, spasticity and increased reflexes develop. At times when the stage of reflex activity supervenes, there may be spasms of the limbs, automatic bladder contraction, and excessive sweating, due to uncontrolled activity of the spinal centres in response to cutaneous stimuli (mass reflex).

*Paraplegia in flexion*—occurs after a complete transverse lesion as soon as the stage of spinal shock has passed; or in cases of diffuse spinal lesions, follows paraplegia-in-extension after the extrapyramidal motor tracts have also become involved Flexor spasms occur in the lower limbs which in severe cases become fixed in an attitude of flexion.

**Management:** of acute myelitis and paraplegia:

*Aims*—(i) To prevent bedsores and cystitis. (ii) Aid recovery of muscles and reduce contractions

I. ACUTE STAGE—

1. *Care of the skin*—Clean skin thoroughly with soap and water, dry and clean with methylated spirit, then dry and cover with dusting powder. Frequent change of posture, patient should not be left lying with pressure on one area of skin for more than 2 or 3 hours at a time. When change to lateral posture is not possible, pressure on the buttocks can be relieved by laying the patient flat and raising the foot of the bed by 6 to 9 inches. Protect heels by rings of cottonwool or by resting the calves upon small pillows with the heels projecting beyond them.
2. *Care of the bladder*—If retention, do frequent catheterization with strict asepsis, or condom catheter. Prompt treatment of urinary infection if it occurs.

can do no harm and when in doubt it is better to give more than to give less.

3. *Antibiotics*—Benzyl penicillin 250,000 units IM every 6 hours or Erythromycin 250 mg. by mouth every 6 hours for 5-7 days as adjunct to antitoxin and for preventing secondary infection.

4. *Management of laryngeal diphtheria*—In addition to general and specific measures, relief of obstruction to breathing by steam inhalations (the bed being covered with a mosquito net) alternating with $O_2$ inhalations and antispasmodics such as atropine. If restlessness persists and respiration remains distressed, tracheotomy should be performed. The air must still be kept moist. The tube can be removed after about a week.

5. *Management of complications*—
   - (a) *Circulatory failure*—(i) Peripheral failure and shock —Raise foot of bed. Slow intravenous drip of noradrenaline or other suitable pressor amine. Corticosteroids. (ii) Myocarditis—Absolute bed rest. Patient must be nursed flat with no pillows under head. If heart failure oxygen and diuretics. Digitalis should be given cautiously in view of the high incidence of complete heart block. Pacemaker if heart block.
   - (b) *Paralysis*—(i) Of palate—Thickened feeds to prevent regurgitation. (ii) Of pharynx—Raise foot of bed for drainage of mucus. Digital swabbing or mechanical aspiration. Tube feeding may be necessary or IV. (iii) Respiratory paralysis—Use of respirator and maintenance of adequate airway. (iv) Peripheral palsies—Rest, splinting and physiotherapy.

IMMUNIZATION :—For active immunization see Chapter 10.

For passive immunity injection of 1,000-2,000 units of diphtheria antitoxin for temporary protection of exposed susceptible children. Immunity lasts for about 2 weeks. May be given simultaneously with active immunization.

## 2. WHOOPING COUGH (PERTUSSIS)

**Etiology :**

*Age*—any, but rare after age of 10. 50% in children under 4 years. Seasonal incidence. Sporadic and epidemic. Association with measles common. Causative organism—Bordetella pertussis. It is likely that a proportion of cases diagnosed clinically as

which, however, remains latent until adult life. Symptoms are eventually precipitated by unknown factors that activate the persistent infection. Subsequent relapse or progression is partly a result of autoimmunity to some element of myelin, resulting in further damage to the nervous system.

**Clinical features:**

1. Onset—Monosymptomatic in about 80%. Common modes of onset are—(i) Sudden onset of weakness or paresis of lower limb. (ii) Impairment of cutaneous sensation in lower limbs and trunk. (iii) Brain stem symptoms such as diplopia, vertigo, ataxia.
2. Motor symptoms—Weakness of the legs—Commonly weakness of one leg after exertion with recovery after rest but with subsequent progression.
3. Sensory changes—Paraesthesia; pain rare. Impairment of postural or vibration sense.
4. Ocular—Unilateral retrobulbar neuritis, pallor of temporal half of disc in 50%. Diplopia and nystagmus common.
5. Mental—Emotional changes, euphoria, delusions, terminal dementia.
6. Reflexes—Abdominals lost early, plantars usually extensors.
7. Sphincters—Urgency, frequency and incontinence of urine and rarely of faeces.
8. *Lhermitte's sign*—not specific for MS but highly suggestive.

C.S F.—Slight increase of cells and proteins, colloidal gold curve paretic or luetic. Gamma-globulin content of spinal fluid of more than 14 per cent of the total spinal fluid protein strongly supports diagnosis of multiple sclerosis. Presence of aligoclonal bands in CSF.

CLINICAL FORMS—

1. *Spinal form*—Predominant symptoms those of damage to long tracts in spinal cord particularly posterior and lateral. Spastic-ataxic paraplegia.
2. *Brainstem or cerebellar form*—Retrobulbar neuritis, or affection of 3rd, 6th or vestibular nerves. Visual loss, vertigo and unsteadiness of gait may be the first symptoms. Charcot's triad of nystagmus, intention tremor and scanning speech is present in high percentage of patients in late stage of disease.

5. *Fibrocystic disease in infants*—Pulmonary lesion leads to paroxysmal coughing attacks, family history, steatorrhoea, absence of trypsin from duodenal contents, increased concentration of sodium and chloride in sweat.

**Complications:**

1. *Respiratory system*—(a) *Pulmonary atelectasis*—Common complication during paroxysmal phase due partly to viscid mucus secretion and bronchial blockage, and partly to bronchial and peribronchial inflammation. Degree of collapse varies from small segmental areas to collapse of a whole lobe. Recovery occurs in most cases in 2-3 weeks. Persistent low-grade infection accompanying atelectasis may lead to subsequent bronchiectasis. (b) *Bronchopneumonia*—usually due to secondary bacterial infection and closely associated with atelectasis. (c) *Hilar adenitis and activation of tubercular disease* may occur.
2. *CNS—Convulsions*—Convulsions during spasms are common in babies and may progress to status epilepticus, coma, hemiplegia or cranial nerve palsies.
3. *Mechanical or pressure effects*—(a) Rise in intrabdominal pressure—Inguinal and umbilical herniae and prolapse of rectum. (b) Rise of intrathoracic pressure—Subconjunctival hemorrhage common, occasionally petechiae on face, neck and upper trunk. (c) Intracranial hemorrhage rare. (d) Fraenal ulcer due to laceration by lower central incisors when the tongue protrudes forcibly during spasms. (c) Pneumothorax and mediastinal emphysema rare.

**Management:**

1. *General measures*—(a) Isolation in a well ventilated room. (b) *Feeding*—Food finely divided and in small feeds. Since feeding often provokes a paroxysm of coughing followed by vomiting in infants, it may be necessary to give a second feed after vomiting has occurred, this being more readily retained. (c) *Management during a spasm*—The child should be lifted from the cot and held in the head down position, patting the back until the spasm is over, to avoid inhalation of secretions and vomit.
2. *Drugs*—(a) *Sedatives*—Phenobarbitone, or syrup of chloral hydrate, or antihistamine such as promethazine elixir 10-20 mg. per dose. (b) *Antispamodics*—Tinct. balladona 10-15 m. t.d.s. or atropine methyl nitrate as 0.6 per cent alcoholic solution, 1 drop for each year of age upto maximum of 8

4. *Other features*—Low hair line, short neck and restricted neck movements (Field's triad). Dysplastic face, associated congenital anomalies and absencae of cranial nerve palsies.

*Radiology*—Visualisation of dislocation of odontoid process

**Differential Diagnosis:**

1. *Basilar invagination*—Displacement of dense of axis into foramen magnum. Usually presents as picture of posterior fossa lesion. Lower cranial nerve palsies, cerebellar signs, spinothalamic variety of sensory loss over the arms and signs of increased intracranial pressure. On radiology dense of axis is seen to extend above a line drawn from the posterior end of the hard palate to the posterior lip of the foramen magnum.
2. *Occipitalization or fusion of other cervical vertebrae* (Klippel-Feil anomaly)—Usually asymptomatic. Signs due to other associated anomalies.
3. *Arnold-Chiari malformation*—The medulla and cerebellum are elongated and extend down through the foramen magnum Usually presents with cerebellar signs and syringomyelia or syringo-bulbia like clinical picture. Spina bifida frequent.
4. *Syringomyelia*—Deep reflexes of upper limbs usually absent whereas they are exaggerated in atlanto-axial dislocation. Trophic ulcers constant.

MANAGEMENT—Reduction of dislocation by neck traction, or if this is not possible by skull traction. The lateral atlanto-axial joints are then fused by an anterior approach.

## 18. DEFICIENCY DISORDERS OF THE NERVOUS SYSTEM

**Vitamin $B_1$** (Aneurin or thiamine) **deficiency**—

1. *Nutritional polyneuropathy* (Neuritic beriberi).
2. *Wernicke's encephalopathy*—results from petechial hemorrhages in the midbrain and mamillary bodies. *Signs*—Rapidly oncoming mental confusion, with disorientation in time and place and increasing but restless sleep which advances to the border of coma. Signs show ophthalmic disturbances consisting of ophthalmoplegia so that the range of conjugate gaze is restricted, nystagmus, drooping of eyelids and abnormal pupillary reflexes. Plantar reflexes usually extensor and often cerebellar ataxia in the limbs.

## Meningococcal Meningitis

**Etiology:** *Age*—common in children often below age of 5, but older children and young adults more affected during epidemics, which are more common during winter. *Transmission*—Infection commonly occurs by way of nasopharynx. Carriers are the principal source of transmission. The meningitis is a part of a septicemic process.

*Incubation period*—1 to 5 days.

**Clinical features:**

I. MENINGITIC FORM:

1. *Stage of invasion*—Abrupt onset with severe headache, vomiting of cerebral type, fever, pains in neck and back, rigors or in children convulsions, restlessness, insomnia, delirium.
2. *Meningeal stage*—(a) More severe headache, intense lumbar pain. (b) Muscular rigidity—Neck rigidity, head retraction. Kernig's and Brudzinski's signs; sometimes muscular twitchings and tremors. (c) Ocular symptoms—include optic neuritis, uveitis or purulent choroiditis usually unilateral. Optic atrophy may result particularly in association with hydrocephalus. Conjunctivitis and corneal ulcers. (d) Rash—erythematous macules which soon become petechial (spotted fever). Petechiae in the conjunctivae. (e) Temperature variable, usually more than 30° C. (f) Exaggeration of deep jerks. (g) Retention of urine and constipation. (h) Herpes febrilis. (i) Pulse—slow in relation to temperature, may be irregular. (j) Rapid emaciation.

   *Diagnosis*—(a) Leucocytosis—20,000–30,000 per c.mm. (b) C.S.F.—Turbid or purulent, under pressure, large number of pus cells mainly polymorphs and presence of meningococci on smear or culture.

**Complications and sequelae:**

1. *Septicemia*—Meningitis is associated with meningococcal septicemia and the organism may settle in tissues such as lungs, bones, joints or eyes causing focal infection.
2. *Arthritis*—may be either purulent arthritis occurring early in the illness, or arthritis of later onset, possibly due to immune reaction.
3. *Neurological*—(a) Cerebral oedema of severe degree causing fluctuating neurological signs. (b) Focal neurological

*Clinical features*: Onset—usually gradual, sometimes rapid

1. *Subjective sensory disturbances*—Paraesthesia—Tingling and numbness in toes, later tips of fingers, rarely simultaneously in both upper and lower extremities. Sometimes burning or stabbing pains or even lightning pains like tabes. Paraesthesia begins at periphery and tend to spread upwards.
2. *Objective sensory loss*—sense of vibration, posture and passive movement affected first in lower, later in upper limbs Glove and stocking type of superficial sensory loss. Tenderness of calf muscles.
3. *Motor symptoms*—weakness and ataxia develop at variable interval after onset of sensory disturbances.
4. *Reflexes*—Variable—Ankle jerks lost, knee jerks may be absent. Both exaggerated if lateral column lesion predominates.
5. *Sphincter disturbances*—common. First difficult or precipitate micturition, later retention of urine or incontinence. Impotence early.
6. *Mental changes*—not uncommon. Mild dementia, impaired memory. Confusional psychosis or irritability or depression.
7. *Bilateral primary optic atrophy in 5%.*

*Diagnosis*: Low hemoglobin, macrocytosis, high MCHC, megaloblastic bone marrow, gastric achlorhydria, serum vitamin $B_{12}$ less than 100 pg/ml.

*Management*—1,000 mcg. of vitamin $B_{12}$ IM daily for 7-10 days, then same dose twice a week for one month, then once a fortnight to be continued for the rest of the patient's life.

## 19. EXTRAPYRAMIDAL SYNDROMES

### PARKINSONISM

**Causes:**

1. *Paralysis agitans* (Parkinson's disease).
2. *Post-encephalitic Parkinsonism.*
3. *Symptomatic Parkinsonism*—
   (a) Trauma to nervous system.
   (b) Carbon monoxide intoxication.
   (c) Manganese and other metallic poisoning.

inadequate treatment or occur during specific therapy; (d) C.S.F.—1,000 or 1,500 cells, 30% or more polymorphs. C.S.F. and blood serological tests for syphilis positive. Meningitic type of colloidal gold curve.

4. *Acute viral meningitis*—Sudden onset with rapid course, persistent absence of organisms from C.S.F., change from a polymorphonuclear to lymphocytic type of cell picture in C.S.F., normal figures for chlorides and glucose, absence of residual lesions.

5. *Aseptic meningeal reaction*—

   (a) *Due to septic or necrotic focus within the skull or spinal canal*—e.g., septic thrombosis of intracranial venous sinuses, osteomyelitis of spine or skull, intracranial abscess or septic cerebral emboli. Symptoms are those associated with the primary infection and only occasionally symptoms and signs of meningeal irritation.

   (b) *Due to introduction of foreign substances into the subarachnoid space*—There may be fever, headache and neck stiffness. C.S.F.—Increase in pressure, slight to moderate increase in protein, normal sugar content, varying degree of pleocytosis (polymorphs if fluid purulent, lymphocytes if normal appearance), and absence of organisms on culture.

6. *Leptospiral meningitis*—(a) History of occupational relationship to rats. (b) Liver may be enlarged. (c) Jaundice may appear. (d) Conjunctival injection. (e) Hemorrhages common. (f) C.S.F.—Leptospira may be demonstrated by animal inoculation or culture.

II. MENINGISM—Neck stiffness in presence of normal CSF. May be seen occasionally usually at onset, in typhoid fever, apical pneumonia, acute exanthema, pyelonephritis or cervical lymphadenopathy.

| *Meningitis* | *Meningism* |
|---|---|
| Slow onset usually. | Rapid onset. |
| Delirium, convulsions or coma common. | Delirium, convulsions and coma rare. |
| Vomiting at onset and also subsequently. | Vomiting at onset only. |
| Pulse and respiration may be irregular; relative bradycardia. | No irregularity of pulse rhythm, no bradycardia. |

**Differential Diagnosis:**

| | 1. *Post encephalitic Parkinsonism* | 2. *Paralysis agitans* |
|---|---|---|
| Age ... | Before 40 | After 50 |
| Sex ... | Both sexes | More common in men |
| History of previous encephalitis ... | May be obtained | No such history |
| Oculo-gyric crisis .. | Not uncommon | Absent |
| Mental changes ... | Common | Rare |
| Distribution ... | Less complete and asymmetrical | Complete and symmetrical |
| Rigidity and tremors ... | Rigidity more than tremors | Tremors more than rigidity |
| Rate of progress ... | Rapid | Gradual |

3. *Arteriosclerotic Parkinsonism*—

| *Parkinson's disease* | *Arteriosclerotic Parkinsonism* |
|---|---|
| Earlier age. | Later age. |
| Mental state normal. | May be dementia or epilepsy. |
| No upper motor neurone signs. | Usually bilateral upper motor neurone signs. |
| Reflexes normal. | Increased reflexes and plantar extensor. Pseudo-bulbar palsy may occur. |

4. *Drug therapy*—Prolonged use of drugs such as reserpine or phenothiazine group may produce extrapyramidal signs. Rigidity prominent but there may also be tremor, oculogyric crises, bucco-lingual dyskinesia and retrocollis.
5. *Essential tremor*—Peak incidence in early adult life, and often family history. Affects the hand but nearly always spares the leg. No rigidity. Absent at rest, present on action.
6. *Wilson's disease*—Should be suspected when Parkinsonism is encountered in adolescence. Involuntary movements more variable.

**Management:**

1. DRUGS—

(a) *Anticholinergic drugs*—Mostly diminish rigidity, few have any measurable effect on tremor. The general

Treatment of other types of meningitis—

*Pneumococcal*—Benzyl penicillin 30 mega units/24 hours either as continuous infusion, or rapid small infusions of 4 mega units 4 hourly in 100 ml. normal saline. The dose can be reduced after about 4 days if there is clinical improvement and temperature has fallen. Treatment should continue for 10 days. Chloramphenicol if penicillin sensitivity.

*Hemolytic streptococcal*—same as pneumococcal.

*Staphylococcal*—Penicillin if organism is sensitive, if resistant erythromycin, tetracycline, or chloramphenicol.

*Influenzal*—IV Chloramphenicol 50-75 mg./kg. body weight/day or Ampicillin 6 g. daily by IV infusion or 4-hourly IV injections for first 48 hours, followed by 1 g. IM every 6 hours.

*Pyocyaneus meningitis*—Colomycin in total daily dose of 50-100,000 units/kg. body weight divided into 2 or 4 IM injections. A daily intrathecal dose of 500 to 1,000 units may also be given. Gentamicin I.M. also effective, can also be given intrathecally.

## 4. INFLUENZA

**Etiology**: *Causative agent*: There are three immunological types of influenza. Worldwide epidemics are caused by influenza A viruses, less extensive epidemics by B viruses, and small outbreaks or sporadic cases are due to para-influenza and other agents.

*Incubation period*—1 to 3 days.

**Clinical picture:**

*Onset*—sudden with fever, chilly sensations, and prostration, catarrhal symptoms, headache, pains and dry cough. Sometimes erythematous rash.

Clinical types:

1. *Febrile type*—Only constitutional symptoms—fever, malaise, headache, severe bodyache, catarrh, congestion of eyes and throat, rapid prostration. Dry cough with few or no signs in chest. Fever lasts for 4 to 6 days, there may be relative bradycardia.
2. *Respiratory type*—(a) Bronchitis and bronchopneumonia. (b) Pleurisy, empyema not uncommon. (c) Pneumonia · (i) Fulminating rapidly fatal form in which pneumonia is present from the onset; (ii) a progressive form in which

extension of the ankles (paddling foot movements). Rarely spasmodic torticollis and dystonic spasms of trunk. (iii) Psychiatric disturbances—Mild elation which may progress to restlessness and anxiety. Aggression and hypomanic excitement sometimes supervene. A few patients become depressed and in rare instance paranoia and hallucinations develop. An increase in libido may be experienced by some. (iv) Postural hypotension—Because of this there is greater risk in treating patients with vascular disease. All these side-effects regress when the dose of L-dopa is reduced (v) *On-off phenomenon*—Observed in patients who have been treated for a year or more. Patient loses benefit of the drug temporarily at certain period during the day over a few minutes.

(e) *Carbidopa*—inhibits enzyme which is responsibile for conversion of levodopa to dopamine. Advantages of combining with L-dopa are—(i) Dose of L-dopa can be reduced considerably without plasma concentration falling. (ii) Adverse reactions of L-dopa such as vomiting and cardiac arrhythmia are reduced. (iii) Allows dose of L-dopa to be built up to maximum tolerated levels over days rather than months. Dose—Start with ½ tablet (each tablet contains 25 mg carbidopa and 100 mg levodopa) t d s. increasing by ½ tablet every 2 or 3 days until adverse reactions develop when the dose is reduced by 1/5.

*Side effects of long-term use of combined levodopa and carbidopa*—Dyskinesia, dementia, declining efficacy. Fluctuations in response—related to timing of dose such as 'wearing off reactions' and 'end-of-dose akinesia'; unrelated to timing of dose—on-off effects.

(f) *Bromocriptine*—Useful in patients on levodopa who show fluctuations in response related to timing of the drug. Dose—1 25 mg. at night for first week, increased by 2.5 mg. each week until maintenance dose is achieved Side effects—at start of treatment—nausea, vomiting, postural hypotension. With chronic therapy—headache, nasal stuffiness, GI bleeding, constipation, alcohol intolerance, cold-induced vasospasm.

(g) *Amantadine*—Relieves bradykinesia and rigidity. 100 mg. daily for one week, then twice daily. Degree of benefit declines after few weeks.

(b) *Anti-vital agents*—Amantadine hydrochloride 100 mg. b.d., or isoquinolones may provide significant degree of protection.

## 5. MEASLES

**Epidemiology:** *Age*—mostly children between ages of 3-5 years, rare during first 6 months of life because of transferred passive immunity from mother. *Causative agent*—Myxovirus group. *Mode of transmission*—Highly infectious and spread by direct contact, droplet infection or air by droplets of secretions. Patients suffering from measles shed virus from their respiratory tract during the prodromal period and for 24-48 hours after the rash appears.

*Incubation period*—8-10 days.

*Period of infectivity*—From onset of prodromal period to 4 days after appearance of rash.

**Clinical features:**

*Illness of infection*—Febrile catarrhal attack with fleeting rash in a few hours after exposure to measles.

1. PRODROMAL PHASE—usually lasts for 4-5 days.
   (a) *Fever*—Abrupt rise of temperature to about 102° F.
   (b) *Catarrh*—Coryza, conjunctivitis, photophobia and hacking cough.
   (c) *Koplik's spots* (enanthema) pathognomonic of measles. Appear on 2nd day as minute pin-point bluish white specks with slight reddish mottled areola around them, on buccal mucosa usually opposite lower molars. They look like grains of salt. Variable in number. Occasionally large spots few in number. The spots begin to fade with appearance of rash. Red blotches may be seen on soft palate. Koplik's spots may sometimes occur in the lower lip in front of the lower incisors, and in severe cases the palate and rest of the mucosa are peppered with these spots.
   (d) *Laryngeal involvement*—Hoarseness and laryngeal stridor.
   (e) *Gastrointestinal*—Persistent vomiting and diarrhoea.
   (f) *Fleeting rashes*—either urticarial or erythematous.
2. STAGE OF ERUPTION—(a) *Rash*—On 5th day, red macules appear first behind ear, along hair line and on posterior parts

3. **Dystonia musculorum deformans** (Torsion spasm)—

Disease of basal ganglia of unknown etiology characterised by occurrence of slow, strong, sustained, twisting, turning and writhing movements of the somatic muscles, particularly muscles of girdle and trunk. Abnormal movements and spasm of muscles produce bizarre stepping gait and often dysarthria, racial grimacing and torticollis.

4. **Spasmodic torticollis**—

Usually starts in adolescence or early adult life and characterised by marked tonic or clonic movements of sternomastoid, trapezius and other muscles of neck. This results in the neck being twisted to one side, the shoulder being elevated and sometimes the head tilted backwards. The movements are intermittent, aggravated by emotion and anxiety and stop during sleep. Distinction between hysterical and organic torticollis may be difficult.

## 20. HEREDITARY AND DEGENERATIVE DISORDERS

### Cerebral diplegia

CONGENITAL DIPLEGIA is a term used to describe a heterogenous group of cases with damage to the nervous system in utero, at birth or in early life. *Symptoms and signs* can be roughly divided into three groups—Spastic, athetoid and ataxic. In addition, there may be signs of damage to somatic sensory cortex, speech centres or optic pathways resulting in sensory defects, dysphasia, apraxia or hemianopia. About half the cases are mentally retarded.

### Syringomyelia

DEFINITION AND ETIOLOGY—A chronic progressive disorder in which cavitation (syrinx = pipe) develops within the central gray matter of the spinal cord usually cervical and sometimes extends into the lower brainstem (syringobulbia). Usual age 25-40 years, more common in males. Common segment affected first is 1st thoracic. Associated conditions—Congenital anomalies of cervico-cranial junction, sepecially Arnold-Chiari malformation, other cases are associated with abnormal tissue at the exit foramina of fourth ventricle.

*Mechanism*—The normal pulsatile flow of spinal fluid from ventricular system does not escape through the exit foramina

**Varieties :**

1. *Modified measles*—In measles modified by gamma globulin all symptoms and signs may be suppressed except the rash in the form of discrete macules scattered over the trunk.
2. *Measles in adults*—Constitutional symptoms may be more severe but less tendency to complications.
3. *Atypical measles*—in children who have received measles vaccine. Fever with petechial rash and oedema on lower legs and dorsum of feet.
4. *Morbilli bullosi*—Severe variety in which some of the lesions become bullous. May occur in malnourished children.
5. *Hemorrhagic measles (black measles)*—Hemorrhages into skin and bleeding from any or all of the body orifices.

**Complications :**

1. *Due to secondary bacterial invasion*—(a) Purulent conjunctivitis. (b) Bronchopneumonia. (c) Otitis media.
2. *Neurological*—(a) Febrile convulsions are most common. (b) Post-measles encephalitis (7-10 days after onset of illness). (c) Subacute sclerosing panencephalitis (SSPE) occurring upto 5 years after attack of measles. Evolves over a period of months and leads to death within 2 years. Dementia is the presenting feature followed by myoclonic jerks and signs of damage to pyramidal and extrapyramidal tracts.

**Differential Diagnosis :**

PRE-EXANTHEMATOUS STAGE—Common cold, influenza, catarrhal stage of whooping cough.

EXANTHEMATOUS STAGE—

1. *Rubella*—(German measles)— No Koplik's spots, small shotty enlargement of suboccipital, posterior cervical and post-auricular lymphnodes; catarrhal symptoms and systemic disturbances slight. In measles mucous membrane is injected and dirty, in rubella it is pale and clean.
2. *Drug eruptions*—especially that caused by ampicillin. Tends to persist longer and may have an urticarial element. Absence of catarrh and failure of rash to evolve from above downwards.
3. *Smallpox*—in early stages; further distribution and evolution of rash diagnostic.
4. *Serum rashes*—Rash dense at site of injection, typical wheals.

(b) *Juvenile familial benign muscular atrophy*—Usually seen later in infancy. Differs from Duchenne type of dystrophy by presence of muscle fasciculation, denervation atrophy on EMG, and normal serum creatine kinase level.

(c) *Benign spinal muscular atrophy of childhood and adolescence* (Kugelberg-Welander syndrome)—Heredofamilial form of muscular atrophy which may begin at any age from late infancy, early childhood or adolescence to early adult life. Proximal muscles of both upper and lower limbs usually affected Presence of fasciculations. Course variable but as a rule deterioration is slow.

(d) *Progressive muscular atrophy* (Motor neurone disease).

| *Spinal muscular atrophy* | *Progressive muscular atrophy* |
|---|---|
| 1. Age—2 to 20 years | Above 40 years. |
| 2 Bilateral symmetrical | Asymmetrical. |
| 3. Proximal muscles involved. | Distal muscles affected more commonly at onset. |
| 4. Family history. | No family history. |
| 5. Deep reflexes lost | Deep reflexes lost or brisk. |
| 6. Progress slow. | Comparatively rapid progress. |
| 7. Prognosis better. | Prognosis worse. |
| 8. Bulbar muscles not commonly involved. | Bulbar muscles usually involved. |

(2) *Infective*—Anterior poliomyelitis.

(3) *Toxic*—Tri-ortho-cresyl-phosphate poisoning. Tick paralysis.

(4) *Electric shock.*

**Motor neurone disease**

DEFINITION—A disease of adult life usually beginning after age of 40 more in males and characterised by clinical effects of progressive degeneration of anterior horn cells of spinal cord, certain motor nuclei of brain stem and corticospinal tracts.

1. *Progressive muscular atrophy*—Onset is usually with weakness of muscles of one hand or forearm, less often footdrop due to affection of muscles of foot. The weakness

## 6. RUBELLA

*Causative agent*—Rubella virus.

*Incubation period*—14-21 days.

*Period of infectivity*—from 7 days before to 4 days after appearance of rash.

*Mode of transmission*—Droplet spread or direct contact.

SYMPTOMS AND SIGNS :

*Rash*—Exanthem occurs more often in older children and adults on first or second day of illness, first on face and behind the ears, and then spreads downwards to trunk and limbs. The predominant lesion is a pink macule, although maculopapular and hemorrhagic elements may be found. The rash seldom persists for more than 4 days and is not followed by staining or desquamation. Rubella without rash is common in young children.

*Lymphadenopathy*—Slight enlargement of lymphnodes, particularly of suboccipital and posterior auricular groups.

*Throat*—inflamed, but exudation uncommon. Complete absence of catarrh in respiratory tract.

*Conjunctival injection*—often accompanied by a feeling of grittiness is common.

COMPLICATIONS : are caused directly by the virus. Secondary bacterial infection does not occur.

1. *Arthralgia and arthritis*—usually in young women with involvement of small joints of hands or feet, at times larger joints. Arthritis may be accompanied by tenosynovitis and peripheral neuritis.
2. *Encephalitis*—Rare, affects adults more frequently and develops usually within a day or two of the appearance of rash.
3. *Thrombocytopenic purpura*—appears after about a week and may occasionally persist for several months.

DIAGNOSIS :

*Haemagglutination-inhibition test* (HAI)—HAI antibody level rises within 24-48 hours, reaches a peak in 6-12 days and persists for a long time.

*Complement fixation test*—Determination of rubella-specific IgM antibody if there is delay in obtaining blood sample.

**2. Spino-cerebellar group—**

1. *Hereditary spastic ataxia of Marie.*
2. *Spino-pontine degeneration.*
3. *Dyssinergia cerebellaris myoclonica* or Ramsay Hunt syndrome.
4. *Hereditary periodic ataxias* (including Hartnup's disease).
5. *Olivo-ponto-cerebellar atrophy of Menzel*—Pyramidal and cerebellar affection with ocular signs common. Progresses to extrapyramidal involvement.

**3. Cerebellar group—**

1. *Ataxia telengiectasia* or Madame Louis Bar syndrome.
2. *Cerebello-olivary degeneration of Holmes*—Pure cerebellar ataxia of late onset.
3. *Marinesco-Sjogren-Garland disease*—Ataxia with mental retardation and lenticular opacities.

## 21. CEREBELLUM AND ITS DISORDERS

**Anatomy**—The cerebellum, situated in the posterior fossa beneath the tentorium, is attached to the brain stem by the superior, middle and inferior peduncles, through which fibres enter and leave. The cerebellum can be subdivided into 3 parts These with their afferent connections and functions are as follows :

| *Lobe* | *Afferent connections* | *Function* |
|---|---|---|
| *Anterior* (Paleocerebellum) Ant vermis and contiguous paravermian cortex | Dorsal spinocerebellar (lower limbs) and ventral spinocerebellar (upper limbs) | Posture and muscle tone |
| *Posterior* (Neocerebellum) Middle portion of vermis and lateral hemispheres | Cerebral cortex via pontine nuclei and brachium pontis (middle cerebellar peduncle) (Pontocerebellar) | Co-ordination of skilled movements |
| *Flocculonodular* (Archicerebellum) | Vestibular nuclei (Vestibulocerebellar) | Equilibrium |

explain the degree of risk to the patient and decide about termination of pregnancy.

(b) *Suspicion of having been in contact with rubella*—(i) If possible, confirm the diagnosis by serological studies on the original case. (ii) If contact is close and the pregnant woman has decided to continue with pregnancy give 1500 mg. of immunoglobulin IM as soon as primary sample of serum is obtained. If there is no detectable antibody, give further 1500 mg. immunoglobulin within 3-4 days. (iii) If she does not want to continue with pregnancy, or if the contact is not close, do not give immunoglobulin. (iv) In either case, take a second sample of blood after 3-4 weeks to see if there has been sero-conversion. The risk to the foetus when the mother has a subclinical attack is not known with certainty but appears to be slight. Should the mother develop an illness with serological evidence of rubella, the risks should be explained and decision taken about termination of pregnancy.

## 7. CHICKENPOX

**Epidemiology:** *Age*—Primarily children, uncommon in adults in whom the disease tends to be more severe. *Causative agent*—Virus is identical to virus of herpes zoster and hence designated varicella zoster virus. (V-Z virus) *Transmission*—Droplet discharges from air passages. May be direct skin contact or by recently contaminated utensils.

*Incubation period*—14 to 15 days.

*Period of infectivity*—From 7 days before onset of rash until 6 days after development of last vesicle.

**Clinical features:**

STAGE OF INVASION OR PRODROMATA—not constant. Headache, sore throat and fever for 24 hours. Prodromal rashes—erythematous, scarlatiniform, morbilliform or urticarial. Rarely hemorrhagic—petechial or purpuric.

STAGE OF ERUPTION—

(1) *Enanthem*—Earliest lesions on buccal and pharyngeal mucosa.

(2) *Exanthem*—(a) *Evolution*—in crops; at first on back, then chest, abdomen, face, and lastly limbs. (b) *Character*—at first macule, in few hours dark pink papule which soon turns into vesicle—(i) superficial i e. 'on' rather than 'in'

3. *Vascular*—Syndrome of posterior inferior cerebellar artery, anterior inferior cerebellar artery or superior cerebellar artery. Vertebro-basilar insufficiency.
4. *Demyelinating*—Multiple sclerosis.
5. *Drugs*—Phenytoin, barbiturates, alcohol, streptomycin, gentamycin, kenamycin, piperazine citrate.
6. *Hyperpyrexia.*

II. **Chronic:**

1. *Congenital*—Cranio-vertebral anomaly, Dandy Walker syndrome.
2. *Hereditary ataxias.*
3. *Familial*—e.g., Refsum's disease, lipidoses, leucodystrophies.
4. *Degenerative*—Holme's primary cerebellar degeneration, olivo-ponto-cerebellar degeneration, olivo-rubro-cerebellar degeneration, delayed cerebellar degeneration.
5. *Neoplastic*—CP angle tumor, pontine tumor, cerebellar tumor.
6. *Alcohol.*

**Clinical features:** of cerebellar lesion:

A. **Localising value:**

I. DISORDERS OF POSTURAL FIXATION—

1. *Hypotonia.*
2. *Past pointing and Barany's test*—With arms outstretched and eyes shut, the muscular tone is inadequate to maintain appropriate posture. There is slow fall away of the arm on side of lesion.
3. *Pendular knee jerk.*

II. DISORDERS OF MOVEMENTS—

1. *Intention tremor*—Increased irregularity of movement as the finger approaches the nose in finger-nose test.
2. *Dysmetria*—Inability to arrest movement at desired point e.g., exaggerated splaying of fingers in grasping a small object, or lifting the leg too high when attempting to place it on a chair with eyes shut.
3. *Dyssynergy*—Defective co-ordination of various muscles and muscle groups participating in a movement, e.g., extending the trunk backwards without simultaneous flexion of the knees thus losing balance.

therapy. Chest x-ray shows large nodular opacities scattered throughout the lung fields.

3. *Post varicella encephalitis*—more common in children than adults. Differs from other virus encephalitides because of predominance of cerebellar signs such as ataxia, vertigo, and nystagmus. Cranial nerve palsies particularly of oculomotor and facial nerves may develop during the illness.
4. *Myocarditis* and rarely pericarditis.
5. *Appendicitis*—may occur as a result of a lesion in the wall of the organ; perforation is likely.

DIAGNOSIS—Electron microscopy readily helps to distinguish varicella from variola virus but does not differentiate between members of the herpes virus group. Agar-gel diffusion tests on skin scrapings, and complement-fixing antibody estimations of paired sera or detection of multinucleated giant cells in scrapings from skin lesions are valuable in doubtful cases.

**Differential Diagnosis:**

1. *Smallpox*—Of all diseases other than smallpox which have to be differentiated, chickenpox is the only one in which mouth lesions are usually present. Rash monomorphic, circular, mainly on convexities, umbilicated, slow evolution. Secondary fever.
2. *Papular urticaria*—Haphazard distribution, face rarely invaded and mouth never, lesions appear in crops chiefly at night, intense itching, dietetic disturbances.
3. *Infected scabies*—Lesions never occur in mouth, face not affected except occasionally in children, identification of sarcoptes scabiei from burrows.
4. *Impetigo contagiosa*—Mostly on face, mucous membranes not affected.
5. *Herpes zoster*—Unilateral distribution corresponding to nerve roots.
6. *Insect bites*—on the face, which have become septic. Central puncta.
7. *Dermatitis herpetiformis*—Erythematous papulo-vesicular and urticarial lesions markedly pruritic. Runs a chronic course with residual pigmentation.
8. *Rickettsial pox*—Appearance of primary lesion, influenza-like illness and generalised papulo-vesicular eruption.

B. OF CEREBELLAR ATAXIA

1. *Cerebellar tumors*—Acoutic neuroma—Auditory nerve involvement, cerebellar signs on same side, other cranial nerve involvement (5th, 6th, 7th) and evidence of increased intracranial pressure.
2. *Acute cerebellar ataxia of childhood*—probably follows encephalitis. The onset is usually subacute with increasingly ataxic gait, tremor and disturbances of external ocular movement including nystagmus being most prominent.
3. *Multiple sclerosis*—Characterised by dissemination in time (relapses and remissions) and space (multiple levels). Bilateral extensor plantar responses with unilateral motor symptoms suggest diagnosis of MS Ataxia frequent and disabling. Monocular or ataxic nystagmus, in which movement of the abducting eye is limited on lateral gaze and there is coarse oscillation of the abducting eye is considered pathognomonic.
4. *Lateral medullary syndrome* (Wallenburg's syndrome)—Sudden onset of symptoms without loss of consciousness Clinical features due to involvement of following neurological structures on same side—(a) Dysphagia due to paresis of soft palate and hoarseness due to paralysis of vocal cord. (b) Descending nucleus and tract of 5th nerve—burning sensation on same side of face with loss of pain and thermal sensibility (c) Spino-thalamic tract—loss of pain and thermal sensibility on opposite side of body below face. (d) Descending vestibular nucleus—vertigo, nausea, nystagmus. (e) Spino-cerebellar tracts—Ataxia and intention tremor on limbs on same side with hypotonia and diminished reflexes and tendency to fall to same side (f) Sympathetic pathway—Horner's syndrome.
5. *Cranio-vertebral anomalies*—Clinical syndromes include high cervical cord compression, syringomyelia, lower cranial nerve palsies, cerebellar signs and hydrocephalus. Diagnosis—(a) Field's triad—Short neck, low hair line, restriction of neck movements (b) Mirror movements—On closing one hand the other also closes. (c) Upper limbs affected before lower. (d) Early affection of posterior column—Loss of position sense at distal interphalangeal joint (Foramen Magnum sign). (e) Pyramidal signs. (f) Wasting of upper limbs due to vascular affection. (g) Cerebellar signs—Nystagmus, inco-ordination.

*Exanthem*—(a) *Evolution*—(i) *Maculopapule*—The individual spots begin as pin-head macules like 'angry flea bites' which in few hours turn into 'shotty' papules. (ii) *Vesicle*—By the end of the 3rd day the lesion is filled with clear fluid. (iii) *Pustule*—By the 5th day the fluid in the vesicles turns turbid. This process takes place slowly over the whole body and by the 8th day the last lesions on the legs become typical pustules. (iv) *Scab*—The rash begins to dry up and shrivel into scabs. The first scabs are fully formed and beginning to separate by 12th or 13th day but it is several days more before the last of the scabs reach this stage. (b) *Distribution*—The rash spreads in orderly fashion. It starts on the face and proceeds downwards over the arms, back and legs, coming out most profusely on the periphery of the body (centrifugal). It also has a tendency to come out on prominences rather than in hollows, and on exposed or irritated, rather than on protected parts of the body.




Fig. 8 2 Temperature chart in smallpox. High fever on first day, falls with true rash, rises again with maturation—"secondary fever", commences to fall between 10th to 14th day.

## I. Non-myotonic forms: (Pure muscular dystrophies).

**(1) X-linked muscular dystrophy:**

(a) PSEUDO-HYPERTROPHIC MUSCULAR DYSTROPHY (Duchenne type):

*Etiology*—Age—5 to 10 years, rare after puberty. Sex—males predominate. Familial—exhibited by males but transmitted by females.

*Symptoms*—

(i) *Onset*—gradual, clumsiness and frequent falls.

(ii) *Attitude on standing*—Marked lordosis of lumbar spine, shoulders held far back and scapulae project. The large size of the buttocks often makes the lordosis appear more accentuated than it is in reality. Abdomen protuberant.

(iii) *Muscles*—Usually involved symmetrically: (i) Hypertrophy of—deltoid, infra-spinal, glutei, quadriceps and calf muscles; less often supraspinati, triceps and biceps; rarely serratus anterior, muscles of forearms and masseters. Macroglossia is sometimes observed. (ii) Atrophy of—lower portion of pectoralis major, biceps, latissimus dorsi and thigh muscles. (iii) Muscles not affected—hands and face. The weakness of the shoulder girdle muscles is easily demonstrated by picking the child up under his arms, when the arms go up and the child tends to slip through one's hands.

(iv) *Gait*—When walking the child waddles. The trunk and head are usually held very erect. In sitting, the lordosis, which is present on sitting passes into a kyphosis, the back being bent according to the degree of weakness of the dorsal muscles.

(v) *Rising from the ground* (Gower's sign)—The way in which the child rises from the prone position is characteristic. The child turns on his side, flexes his knees and hips, and with arms extended raises his trunk to assume a position of kneeling. The feet are brought forwards and the legs extended at the knees. Then by bringing the hands successfully to the calves, knees and thighs, he 'climbs up' his own legs and pushes his body to the upright position. This succession of movements is un-

5. *Variola minor* (Alastrim)—"Influenza with spots", mild attack, slight prodromal symptoms, lesions appear slowly, but mature more rapidly, secondary fever uncommon, few complications.

**Differential Diagnosis:**

1. *Chickenpox*—Monomorphic rash central rather than peripheral. Little constitutional upset.
2. *Measles*—Velvety maculo-papules on forehead in early stage in severe cases simulate smallpox. Koplik's spots and subsequent evolution of eruption differentiates.
3. *Skin diseases*—
   (a) *Papular urticaria in children*—Lesions absent or sparse on face, none in mouth, abundant round ankles. Scratch marks and evidence of old lesions. No ill health.
   (b) *Pustular syphilide in adults*—Distribution not centrifugal, papules may be seen mixed with pustules. Other signs of syphilis.
   (c) *Erythema multiforme*—of bullous type. Large superficial bullae especially on backs of hands and legs.
4. *Drug rashes*—Sulphonamides, phenobarbital, iodides, bromides, etc.,—history of administration of drug. No general symmetrical centrifugal distribution.

**Complications:**

1. *Eyes*—Conjunctivitis, keratitis and iritis, panophthalmitis.
2. *Skin*—Pustular dermatitis.
3. *Respiratory*—Laryngitis, laryngeal oedema, bronchitis, bronchopneumonia.
4. *CNS*—Encephalomyelitis, peripheral neuritis, acute psychosis.
5. *Cardiac*—Myocardial failure.
6. *Metastatic*—Suppurative arthritis, osteomyelitis, empyema and otitis media with spread to mastoid and meninges.
7. *Associated with debility and anemia*—Arteritis, phlebitis, orchitis, and Zenker's degeneration of muscle.
8. *In pregnancy*—Death of foetus and abortion if severe disease.

**Management:**

1. *Nursing*—Toilet of nose and mouth, irrigations of eyes with boric lotion, potassium permanganate baths (1 : 5,000) or

wasting and weakness. Muscle biopsy similar to myotonic dystrophy.

(c) OCULAR AND OCULOPHARYNGEAL MUSCULAR DYSTROPHY—Presents in adult life with ptosis and extraocular weakness, usually without significant diplopia. Dysphagia is prominent in some families. Face and sternomastoid are commonly affected and most patients develop weakness in the legs. Relatively benign course. Muscle biopsy shows vacuolar changes.

*Management*—None specific. Principles are to treat complications such as respiratory and urinary infection if and when they occur, to avoid trauma which may easily result in fracture of limb bones and to keep the patient active as long as possible.

II. **Myotonic disorders**—Failure of voluntary muscles to relax immediately innervation ceases.

1. MYOTONIA CONGENITA—(i) *Thomsen's disease*—begins at birth and affects entire voluntary musculature giving rise to generalised muscular stiffness. Presents in infancy with generalized myotonia without weakness. (ii) *Becker type*—usually begins later in childhood and is characterised by striking muscular hypertrophy giving the patient a Herculean appearance.

2. DYSTROPHIA MYOTONICA—(Myotonia atrophica)—Usually begins in adolescence or early adult life. Patients have below average intelligence and present a haggard appearance due to combination of frontal baldness, ptosis, facial weakness and atrophy of temporalis, masseter and sternomastoid muscles. The jaw sags and speech is slurred due to tongue myotonia. Weakness and wasting in the limbs is predominantly distal in distribution. Other features of the disease include—testicular atrophy, cataracts, cardiac conduction defects, pulmonary hypoventilation, mild endocrine disturbances and intellectual deterioration. Death occurs before expected age from cardiac failure or pulmonary infection. CPK is normal or slightly elevated. Muscle biopsy shows chains of central nuclei, ring fibres and selective atrophy of type I fibres. Plasma IgG is low.

3. PARAMYOTONIA CONGENITA—Generalised myotonia accentuated by cold and accompanied by episodes of weakness related to a disturbance of potassium metabolism.

—Punctuate erythema consisting of innumerable scarlet pin-points. On forearms and legs blotchy or pimply appearance. Pressure produces transient blanching of rash. In addition to punctation and erythema, minute petechiae or small linear hemorrhages may sometimes be seen on flexures of elbows (Pastia's sign), groins, wrists and knees. (iii) *Disappearance* —Rash fades in 3-4 days becoming a dirty brown tint, the staining remaining in flexures of elbows, abdomen and groins for few days.

*Circumoral pallor*—usually well marked and characteristic.

*Tongue*—uniformly coated during the first day or two with a greyish white fur through which protrude the lingual papillae —"white strawberry" tongue. The edges, tip and surface along the median raphe then begin to peel and the fur disappears from before backwards leaving the tongue clean and raw with swollen papillae—"red strawberry" tongue or "ripe raspberry" tongue.

*Throat*—Some faucial inflammation always present. In severe cases, tonsils greatly swollen and intense congestion of throat.

STAGE OF DESQUAMATION AND DEFERVESCENCE—Desquamation of variable degree, depending on the intensity of rash, commences about the end of the first week with cracking and pinholing of the skin of lobes of ears and sides and root of neck. The process then progressively involves the trunk and limbs giving the surface a rough ragged appearance. About the end of the second week the process spreads over fingers and palms. The skin of the heels is the last to be shed in the fifth to sixth week.

**Complications:**

1. *Local*—Peritonsillar abscess or otitis media.
2. *Allergic*—Rheumatic fever or glomerulonephritis.

**Management:**

1. *General*—(i) Isolation. (ii) Rest in bed for 2-3 weeks. (iii) Frequent gargles. (iv) Swabbing of mouth with boro-glycerin. (v) Aspirin and sedatives for restlessness.
2. *Specific*—Oral penicillin V 250 mg. t.d.s. or Penicillin G 400,000 units t.d.s. for 10 days, or Benzathine penicillin 600,000–1,200,000 units IM as single dose is followed by decreased toxicity, fall of temperature, and reduction in incidence of pyogenic complications and carriers. In patients sensitive to penicillin Erythromycin 250 mg. q.d.s.

## 23. MYASTHENIA GRAVIS

**Definition :** An acquired autoimmune disorder causing skeletal muscle fatigability and weakness which can present at any age Under age of 40, the disease predominantly affects females, in older age group men predominate. It is associated with a serum IgG antibody that binds acetylcholine receptors (AChR) in the postsynaptic membrane.

**Symptoms and Signs :**

Muscular weakness following repetitive contraction with a tendency to recovery of motor power after a period of inactivity. (a) *Ocular muscles*—first to be involved causing double vision or ptosis. Symptoms are asymmetrical. (b) *Limb weakness* may involve proximal or distal muscles. (c) *Bulbar muscle* weakness leads to loss of facial expression, inability to whistle, difficulty with speech, chewing and swallowing. Weakness of neck muscles and jaw causes patient to use a hand to drop his jaw. (d) *Respiratory muscle involvement*—can lead to shortness of breath and ventilatory failure in severe cases.

Emotional stress, pregnancy and infection apart from exercise can lead to exacerbation of symptoms.

CLINICAL TYPES :

1. *Neonatal myasthenia*—Transient illness in babies born to myathenic mothers.
2. *Juvenile myasthenia*—in younger age group.
3. *Myasthenic* (Eaton-Lambert) *syndrome*—often associated with bronchial carcinoma. Differs from true myathenia thus—(i) Onset in later age. (ii) Power improves following exercise. (iii) Limb muscles more involved than ocular. (iv) Tendon reflexes usually diminished. (v) Poor respose to treatment with neostigmine and abnormal sensitivity to decamethonium.
4. *Congenital myasthenia*—at or close to birth. Immunological abnormalities are lacking.

**Investigations :**

1. *Anti-AChR antibody*—Titre elevated in 90% of patients with generalised myasthenia.
2. *Anti-striated muscle antibody*—detectable in over 90% with thymoma and in about 30% of other patients.

—Punctuate erythema consisting of innumerable scarlet pin-points. On forearms and legs blotchy or pimply appearance. Pressure produces transient blanching of rash. In addition to punctation and erythema, minute petechiae or small linear hemorrhages may sometimes be seen on flexures of elbows (Pastia's sign), groins, wrists and knees. (iii) *Disappearance* —Rash fades in 3-4 days becoming a dirty brown tint, the staining remaining in flexures of elbows, abdomen and groins for few days.

*Circumoral pallor*—usually well marked and characteristic.

*Tongue*—uniformly coated during the first day or two with a greyish white fur through which protrude the lingual papillae —"white strawberry" tongue. The edges, tip and surface along the median raphe then begin to peel and the fur disappears from before backwards leaving the tongue clean and raw with swollen papillae—"red strawberry" tongue or "ripe raspberry" tongue.

*Throat*—Some faucial inflammation always present. In severe cases, tonsils greatly swollen and intense congestion of throat.

STAGE OF DESQUAMATION AND DEFERVESCENCE—Desquamation of variable degree, depending on the intensity of rash, commences about the end of the first week with cracking and pinholing of the skin of lobes of ears and sides and root of neck. The process then progressively involves the trunk and limbs giving the surface a rough ragged appearance. About the end of the second week the process spreads over fingers and palms. The skin of the heels is the last to be shed in the fifth to sixth week.

**Complications:**

1. *Local*—Peritonsillar abscess or otitis media.
2. *Allergic*—Rheumatic fever or glomerulonephritis.

**Management:**

1. *General*—(i) Isolation. (ii) Rest in bed for 2-3 weeks. (iii) Frequent gargles. (iv) Swabbing of mouth with boro-glycerin. (v) Aspirin and sedatives for restlessness.
2. *Specific*—Oral penicillin V 250 mg. t.d.s. or Penicillin G 400,000 units t.d.s. for 10 days, or Benzathine penicillin 600,000–1,200,000 units IM as single dose is followed by decreased toxicity, fall of temperature, and reduction in incidence of pyogenic complications and carriers. In patients sensitive to penicillin Erythromycin 250 mg. q.d.s.

## 24. MUSCULAR WASTING

**Causes:**

A. In Reflex arc

1. *Primary muscular diseases*—
   (a) Muscular dystrophies.
   (b) Myotonia atrophica.
   (c) Polymyositis.
2. *Cord lesions*—
   (a) Motor neurone disease.
   (b) Cord compression.
   (c) Syringomyelia.
3. *Anterior horn cell lesion*—
   (a) Poliomyelitis.
   (b) Progressive muscular atrophy.
   (c) Infantile muscular atrophies—(i) Amyotonia congenita (Oppenheim's disease). (ii) Progressive spinal muscular atrophy (Werdnig-Hoffmann's paralysis).
4. *Root lesions*—
   (a) Cervical spondylosis.
   (b) Injury or tumor of cervical enlargement of spinal cord.
   (c) Hypertrophic cervical pachymeningitis.
   (d) Vertebral metastasis.
5. *Brachial plexus or peripheral nerve lesions*—e.g. (a) Cervical rib pressure. (b) Inflammation of spinal nerve (neuralgic amyotrophy). (c) Carpal tunnel syndrome. (d) Diphtheritic and lead paralysis. (e) Leprosy. (f) Neoplasms of vertebrae. (g) Trauma. (h) Peroneal muscular atrophy.
6 *Myoneural junction disorder*—Myasthenia gravis (muscular wasting very rare).

B. Disuse atrophy—(a) Arthritic—Rheumatoid arthritis. (b) Post-paralytic—Hemiplegia and paraplegia. (c) Therapeutic immobilization—fracture. (d) Psychogenic (hysterical paralysis).

C. Systemic wasting—Tuberculosis, malignancy, thyrotoxicosis

**Investigation of a case of muscular wasting:**

**A. Clinical—**

1. *Heredo-familial incidence*—constant in muscular dystrophy and peroneal muscular atrophy. Absent in motor neurone disease.

3. *Oophoritis*—Less common than orchitis. Bilateral suprapubic pain.
4. *Acute pancreatitis*—in the second week. Sudden onset of epigastric pain, vomiting, pyrexia and prostration. Occasionally the disease presents with only orchitis, benign meningitis or pancreatitis without salivary gland involvement. Diabetes may be a sequel.

B. RARE—

1. *Neurological complications*—(a) Meningoencephalitis—as a rule appears 3-10 days after onset of glandular swelling, but sometimes precedes it and at times appears in absence of glandular swelling. (b) Cranial nerve involvement—Facial, and auditory, nerve deafness may be permanent. (c) Polyneuritis usually temporary.
2. *Arthritis*—Arthropathy develops from 8 days before to 29 days after the parotitis and affects men more often. Involves one or many joints, usually large ones such as hip, knee or ankle. Recovery is complete.
3. *Mastitis*—Mild and transient enlargement of breasts of either sex. *Prostatitis*—in males.
4. *Thyroiditis.*
5. *Nephritis.*
6. *Primary myocardial fibroelastosis*—probably.

DIAGNOSIS—Estimation of serum antibody against the virus for confirming a doubtful diagnosis.

**Differential Diagnosis:**

1. *Acute suppurative parotitis*—Painful, swollen, tender gland with oedema of subcutaneous tissues. Fever. Oedema and redness around orifice of parotid duct Pressure over gland may produce flow of pus in mouth.
2. *Recurrent parotitis*—usually unilateral. Constitutional disturbance slight. Gland may not be enlarged in quiescent stage but its limits are often palpable. X-ray after injection of lipiodol into ducts shows dilatation of ducts.
3. *Salivary calculus*—obstructing either parotid or submandibular duct. Swelling intermittent.
4. *Chronic parotitis*—late stage of recurrent parotitis due to recurrent exacerbations, or associated with calculus.
5. *Drug reactions*—Phenylbutazone may cause allergic reaction with acute, firm and tender enlargement. Organic iodide used for IVP may cause iodide reaction with submandibular swellings.

6. *Muscle pain at rest*—may be seen in acute polymyositis, polymyalgia rheumatica, acute myoglobinuric myopathies and in myopathies of metabolic bone disease.
7. *Muscle tenderness*—None in dystrophy, motor neurone disease, and syringomyelia. In arthritic atrophy and cervical rib pressure, affected muscles are tender to pressure while the wasting process is active. In carpal tunnel syndrome production of typical symptoms by digital compression of median nerve in region of transverse carpal ligament or by forcible flexion of the wrist for one or two minutes.
8. *Fasciculations*—Absent in dystrophy; widespread, in motor neurone disease continuous and marked; inconstant and slight in peroneal muscular atrophy. In cervical rib and arthritic atrophy, fasciculation is present while wasting is in progress, but is not prominent.
9. *Evidence of other signs of disease in the nervous system*—(i) Monoplegia or hemiplegia in disuse or post-paralytic atrophy. (ii) Bulbar paralysis in motor neurone disease. (iii) Pain in neck and shoulder in radiculitis. (iv) C S.F. changes in spinal block. (v) Positive VDRL reaction in syphilitic amyotrophy. (vi) Blue line on gums, and anemia in lead poisoning.
10. *Thickening of peripheral nerves*—in leprosy and hypertrophic polyneuritis.
11. *Sensory changes*—(i) Dissociated anaesthesia in syringomyelia, and spinal tumor. (ii) Glove and stocking type anaesthesia in peripheral neuritis. (iii) Paraesthesia of regional distribution in cervical rib pressure and radiculitis. (iv) Sensory loss in peroneal muscular atrophy.
12. *Reflexes*—Exaggeration of deep jerks and extensor plantar response in syringomyelia, spinal tumor, amyotrophic lateral sclerosis and pachymeningitis.

B. **Laboratory**—

1. *Hematological and biochemical*—to demonstrate nature of primary disorder to which muscular wasting is secondary in case of systemic, inflammatory or metabolic disease.
2. *Serum creatine phosphokinase (CPK)*—Very high levels in Duchenne and Becker dystrophies, acute polymyositis, and acute myoglobinuric myopathies. In other myopathies it may be normal or only moderately raised.
3. *Electromyography* (EMG)—distinguishes myopathic weakness from that due to chronic denervation or to

nation (in acute phase pharyngeal and faecal route, after acute stage only faecal route), reaching the alimentary tract of the host where it multiplies, then entering the blood stream for the phase of viremia. From the blood it passes to the central nervous system (neural phase). This method of spread within the body accounts for the four stages of the disease, at any one of which it may be arrested—(a) Silent infection, virus in the alimentary phase. (b) Abortive poliomyelitis, virus in both alimentary and viremic phases. (c) Non-paralytic polio, virus in alimentary, viremic and neural phases. (d) Paralytic poliomyelitis, virus in all three phases its action on neurone causing paralysis.

**Clinical Features:**

1. PRODROMAL STAGE—start of systemic phase of the infection. (a) Respiratory—coryza, sore throat or cough. (b) Gastro-intestinal—vomiting, diarrhoea or constipation, or (c) Constitutional—fever, headache, drowsiness, restlessness, irritability and sweating. Temperature falls to normal in 36-48 hours and rises again as the pre-paralytic stage is reached, giving a double humped or dromedary chart.

2. PREPARALYTIC STAGE—start of neural phase of the infection. Symptoms and signs of meningeal irritation—

*Symptoms*:

(a) Fever—Temperature rises to 39°C and associated pain and stiffness in the back.
(b) Headache—moderate.
(c) Nausea—is common, vomiting may occur.
(d) Pains—spontaneous or provoked by movement of back, neck, limbs and sometimes abdomen.
(e) Hyperaesthesia—cutaneous may be present; generalised or localised presaging paralysis of that part.
(f) Nuchal and spinal rigidity common—(a) Active tests—(i) Tripod sign—The child is made to sit up unassisted; the knees flex upward and the child places his hands on the bed behind him due to spinal rigidity. (ii) Kiss-the-knee test—Ask child to sit up and kiss his knees. He is able to do so only by flexing the knee. (b) Passive tests—(i) Positive Kernig's and Brudzinski's signs. (ii) Nuchal rigidity. (iii) Head drop sign—The head falls backward when the shoulders are elevated.
(g) Muscle fasciculation—Flickering movements in muscles may be observed.
(h) Micturition disturbance—Some difficulty of micturition or retention of urine may occur; rarely prominent symptom.

5. *Collagen and allied disorders*—Polyarteritis nodosa, sarcoidosis, disseminated lupus erythematosus, rheumatoid polyneuritis.
6. *Malignancy*—Carcinoma especially of lung.
7. *Inherited*—Peroneal muscular atrophy, hypertrophic neuropathy (Dejerine-Sottas disease), hereditary sensory neuropathy, hereditary ataxic neuropathy (Refsum's syndrome), abetalipoproteinemia.
8. *Polyneuritis of obscure origin* (cryptogenic neuropathy)—Recurrent polyneuritis.

**Symptoms and Signs:**

1. *Sensory*—(a) *Subjective disturbances*—Numbness, tingling, feelings of pins and needles in hands and feet, burning sensations, pain in the extremities, sensation of walking on cotton wool or band-like constrictions around wrist or ankles, unsteadiness on the feet and tumbling (ataxia). (b) *Objective sensory loss*—bilaterally symmetrical, impairment of all forms of sensation; glove and stocking type of anaesthesia. Preceding the anaesthesia, there is hyperaesthesia. Tenderness of calf muscles and sometimes nerves.
2. *Motor*—usually extensors more affected than flexors, hence wrist drop or foot drop. Atrophy of muscles, flaccidity.
3. *Autonomic dysfunction*—Dryness or excessive sweating of the extremities, postural hypotension, impotence and sphincter disturbances, diarrhoea and constipation.
4. *Reflexes*—Tendon reflexes absent or reduced. Ankle jerk earliest to be affected.
5. *Trophic changes*—skin glossy, furrowing and falling off of nails, cold extremities.
6. *Sphincters*—unaffected.

**Clinical types—**

1. *Acute onset*—Guillain-Barre syndrome, porphyria, diphtheria, toxic, serum sickness and postvaccinal, malignancy.
2. *Predominantly motor*—Gullain-Barre syndrome, porphyria, diphtheria, lead, Charcot-Marie-Tooth disease.
3. *Predominantly sensory*—Leprosy, diabetes, vitamin $B_{12}$ or thiamine deficiency, malignancy, hereditary sensory neuropathy, uremia, amyloid.

**Investigations:**

1. *Basic investigations*—Urinanalysis, full blood count, ESR, blood glucose, serum electrolytes, serum proteins, liver function tests and chest radiographs.

**Clinical types:**

1. *Abortive poliomyelitis*—Presumptive diagnosis during epidemic. Brief influenza like illness with one or more of the following symptoms—malaise, anorexia, nausea, vomiting, headache, sore throat, constipation and localised abdominal pain. Fever seldom more than 103°F. Coryza and cough uncommon.
2. *Non-paralytic poliomyelitis*—Subjective symptoms as in abortive type but headache, nausea, vomiting more intense, and soreness and stiffness of posterior muscles of neck, trunk and limbs. Fleeting paralysis of bladder not uncommon. Constipation frequent.
3. *Paralytic poliomyelitis*—
   (a) *Spinal form*—Paralysis of flaccid type usually asymmetrical and scattered in distribution, though more severe in one extremity. Legs most frequently involved. Respiratory paralysis may result from involvement of diaphragm and intercostal muscles. Transient bladder involvement in some.
   (b) *Bulbar form*—Muscles supplied by bulbar nuclei involved alone or with spinal musculature. Facial, palatal and sometimes pharyngeal paralysis causes change in voice, difficulty in swallowing, nasal regurgitation and choking when attempting to drink. Respiratory paralysis is the usual cause of death.

**Laboratory diagnosis:**

1. *CSF*—Increased white cell count (usually below 500/mm$^3$), often with high polymorph count in first few days followed by predominance of lymphocytes. Sugar normal.
2. *Culture*—Virus can be grown from pharyngeal swab or throat washings in first week, and from the faeces for several weeks.
3. *Serology*—A fourfold rise in level of antibody to the strain of virus isolated.

**Differential Diagnosis:**

INITIAL PRODROMAL PHASE—(a) *Infections of respiratory tract*—Coryza, tonsillitis, bronchitis, influenza. (b) *Gastro-intestinal disorders*—Gastro-enteritis, rarely acute appendicitis.

PREPARALYTIC PHASE—

1. *Virus (aseptic) meningitis*—Rigidity more marked and persistent. Headache more severe. Consciousness not clear. Hyperaesthesiae not prominent. Paralysis of limbs rare and

fection common, may rarely follow surgical procedure. *Pathogenesis*—Probably a cell-mediated immune response directed at normal peripheral myelin and this may be provoked in some way by certain virus infections.

**Clinical features:**

*Prodromal stage*—Headache, vomiting, slight fever, pain in back and limbs.

*Latent period*—Few days to several weeks; may be absent.

*Stage of paralysis*—Patient may come in this stage, the initial stage being absent. Alarming clinical picture with motor weakness progressing to paralysis and various sensory disturbances.

1. Motor symptoms—onset of paralysis sudden or gradual. Headache and fever. All four limbs may be paralysed simultaneously or first lower and then upper. Proximal and distal segment muscles affected equally. Involvement of muscles of neck and trunk. Dysphagia and ophthalmoplegia. Loss of superficial and deep reflexes.
2. Sensory symptoms—pain, radicular involving most commonly the proximal portions of the limbs, numbness and tingling of limbs. All forms of sensations may be impaired at the periphery, and muscles may be tender.
3. Cranial nerve paralysis—Facial and bulbar paralysis common, and weakness of extraocular muscles may also occur.
4. Reflexes—usually depressed or absent.
5. Sphincters—rarely involved, retention of urine may occur.
6. Symptoms of toxemia—Fever, rash, slight cardiac dilatation, albuminuria, leucocytosis.

*C.S.F.*—Typically elevation of protein with normal cell count. in some no increase of protein and cell count more than 30 cells/mm$^3$.

*Nerve conduction studies*—Marked slowing of motor conduction consistent with underlying pathology of segmental demyelination.

COURSE—Within a period of 3 weeks, this predominantly motor neuropathy progresses to maximum disability, often with complete quadriparesis and respiratory paralysis. Recovery without significant disability occurs in about 80% of patients. Subsequent relapses occur in about 5% of patients

and keep ankles flexed at 90°. (ii) *Sedation*—with barbiturate if required and aspirin. (iii) *Heat*—in form of moist (but not wet) packs of value in relieving muscle soreness or spasm. These should be applied to painful areas for an hour or two morning and afternoon.

2. *Paralytic stage*—(i) Splints—Paralysis of muscles which results in stretching or malposition may require application of removable splints. (ii) Maintenance of fluid intake, vitamins. (iii) Physiotherapy—when muscle tenderness has subsided gentle massage, together with active and passive movements for purpose of relaxing the muscles and preventing contracture. These procedures should not be carried out to the point where they produce pain or fatigue. (iv) Catheterization—may be necessary for few days. (v) Enemas—if abdominal muscles are weak.

   *Paralysis of respiratory muscles or bulbar involvement*—Patient should be watched for signs of respiratory embarrassment and as soon as these have become apparent, placed in artificial respirator immediately. A patient will require assistance with his respiration if normal acts like speaking make him breathless, if cough is ineffective, if he cannot count upto 20 after deep inspiration, if chest excursions are feeble or he cannot push out his upper abdomen. Tracheotomy may be needed when air passages are occluded by mucus or spasm of laryngeal muscles, or may be done as a routine procedure. IV fluids. Penicillin or other antibiotic to prevent pulmonary complications. Use of respirator should be continued in bulbar cases until respiratory centres have recovered.

3. *Convalescent stage*—Physiotherapy, muscles re-education, application of appropriate corrective appliances and orthopoedic surgery. Rehabilitation of the severely paralysed patient.

PREVENTON—

*Active immunization*—*Oral polio vaccine* (OPV)—Given on lump of sugar. First dose at age of 6 months, second after 6-8 weeks and third 6 months later. Further doses at school entry and between ages of 15-19. Oral vaccine has advantage in that local resistance in the gut to any subsequent infection with virulent viruses is produced and the number of carriers of virulent organisms in the community is decreased. Contraindication to OPV are those for any live vaccine—(a) Corticosteroid and immunosuppressive therapy. (b) Reticuloendothelial malig-

**Causes:**

I. *True sciatic neuritis*—Leprosy, polyarteritis nodosa, nerve injury due to injections or trauma, post-herpetic neuralgia

II. *Mechanical pressure on nerves or roots or referred pain*—

1. *In the spinal cord*—Tumors of cauda equina, arachnoiditis, rarely thrombosis, hemorrhage or infection irritating meninges of the cord.
2. *In the cord space*—Protruded intervertebral disc, extra-medullary tumors.
3. *In the vertebral column*—Arthritis, tuberculosis, spondylolisthesis, ankylosing spondylitis, primary bone tumors, secondary carcinoma.
4. *In the back*—Fibrositis of posterior sacral ligaments.
5. *In the thigh and buttock*—Fibrositis, sacro-sciatic band, hip joint or sacroiliac joint disease, neurofibroma, hemorrhage within or adjacent to nerve sheath in blood dyscrasias and anticoagulant therapy, misplaced therapeutic injection
6. *In the pelvis*—Sacroiliac arthritis or strain, hip disease. infection of prostate or female genital tract, rectal impactions, tumors of lumbo-sacral plexus.

**Investigation of a case of sciatica:**

I **History**—

Of trauma, exposure to damp or cold, sphincter control and history of previous attacks. Type of radiation whether nerve root type or vaguely localised deep aching pain. Paraesthesia will occur in pain from sensory pathways but not in referred pain. Pain down the leg on coughing in root lesions and also acute extraneural disease of spine, pelvis and sacroiliac joints.

II **Physical examination**—

1. *Lumbar spine*—Shape, mobility, muscle spasm, list to one or other side on standing (sciatic scoliosis), local tenderness and presence of trigger points in back and limbs. Sciatica may be the first symptom of spinal caries.
2. *Special signs*—(i) Straight leg raising test of Lasegue. Restriction of straight leg raising is usually much more marked in lesions affecting the nerve roots than it is in purely skeletal affections. The straight leg raising test gives a useful indication of the severity of the sciatica, and increased capacity for painless straight leg raising is a helpful objective measure of improvement. (ii) Tender-

3. *Mental symptoms*—Restlessness is the earliest feature of impairment of consciousness, delirium is occasionally encountered. In some a change in behaviour is the presenting symptom and may suggest emotional upset or hysteria. Other patients may present with marked depression and may rapidly lapse into states of unresponsiveness to stimuli and coma. Major or focal epileptic attacks may occur early in the illness.
4. *Changes in respiration*—Involvement of respiratory centre may become manifest initially as hyperventilation followed by irregular respiratory rhythm.
5. *Nervous system manifestations*—(a) Neck stiffness and Kernig's sign may be slight or absent. (b) Focal signs—include pupillary changes, ocular palsies, nystagmus, ataxia and hemiplegia. In herpes simplex encephalitis symptoms such as anosmia, olfactory or auditory hallucinations, aphasia (due to involvement of frontal and temporal lobes). With brain stem involvement, as in rabies, disturbances of consciousness, convulsions and focal defects predominate. Chickenpox encephalitis involves the cerebellum.

*Spinal cord involvement*—may occur with retention of urine and paraparesis or paraplegia, or there may be a poliomyelitis-like component, with evidence of lower motor neurone paralysis.

*CSF*—may be normal, or increased protein, sugar and chloride content normal, 50 to 200 cells, chiefly lymphocytes.

**Differential Diagnosis:**

1. *Bacterial meningitis*—purulent and non-purulent.
2. *Cerebral abscess*—Primary infection in middle ear or elsewhere. C.S.F. shows high polymorpho nuclear cell count.
3. *Intracranial tumor*—if rapidly expanding. Intellectual disturbance and fits in previous weeks.
4. *Emotional cause*—E.E.G. normal, rarely normal in encephalitis.
5. *Toxic and metabolic encephalopathy*—e.g. hypoglycemia, uremia, acute and chronic hepatic failure.

**Sequelae:**

1. *Parkinsonism* (See p. 578).
2. *Sleep disturbances*—Lethargy or insomnia or both.
3. *Mental symptoms*—General intellectual impairment or in milder cases nervousness, dizziness and irritability.
4. *Ocular abnormalities*—Nystagmus, squint, diplopia.

**Differential Diagnosis of conditions causing Sciatica:**

1. *Disc lesion*—Recurrent bouts of lower back pain (lumbago) followed by unilateral sciatica, or pain first in calf or thigh or both without any lumbar symptoms. Straight leg raising limited. Neurological signs absent if small protrusion, present if large displacement compressing the root severely. A huge herniation may squeeze the root so hard that it becomes anaesthetic from ischemia and the pain ceases; straight leg raising becomes once again of full range at the same time as cutaneous analgesia and loss of power and reflexes supervene.

2. *Spondylolisthesis*—Signs of disc lesion together with lumbar deformity. When spondylolisthesis causes intrinsic symptoms, there are backache after prolonged standing, or bilateral sciatica. X-ray taken with the patient standing diagnostic.

3. *Attrition of disc*—Full approximation of the vertebral bodies following attrition of disc allows posterior longitudinal ligament to be unduly long. Sciatica caused by standing due to compression causing posterior bulge of the disintegrated disc which is pushed back into position when posterior longitudinal ligament is taughtened by lying down. X-ray shows markedly diminished joint space with marked anterior beaking at the affected level.

4. *Sacro-iliac arthritis*—Alternation of pain significant, i.e., pain comes in one buttock and posterior thigh, then it transfers itself to the other side. Signs of involvement of 1st and 2nd sacral segments. No lumbar signs. Pressure on anterior iliac spines provokes pain in the buttock. SLR normal.

5. *Secondary deposits in spine*—Gradually increasing central backache, tendency to radiate to lower limb, soon to both. Marked limitation of movements at lumbar spine. SLR of full range though painful at the extreme. Multiradicular signs in lower limbs. Muscle weakness bilateral and unequal and marked.

6. *Benign spinal tumor*—Progressive increase in symptoms. Neurological signs more severe and progressive than in disc lesion. If radiograph shows erosion of bone and induction of epidural anaesthesia does not cause disappearance of pain for the time being, a tumor is very probably present.

10. *Antiviral drugs*—Vidarabine may be useful especially in herpes simplex encephalitis.
11. *Physiotherapy*—in convalescent phase for the patient with residual motor weakness.

SLOW OR LATENT VIRUS INFECTION OF THE CENTRAL NERVOUS SYSTEM.

1. *Subacute sclerosing encephalitis*—probably caused by measles virus. Onset in first or second decade, with progressive dementia and myoclonic jerks. E.E G. characteristically shows periodic complexes. Death usually occurs after several months.
2. *Creutzfeld-Jakob disease*—Clinically this disease is associated with dementia in middle and old age.
3. *Progressive multi-focal leukoencephalitis*—may occur in association with carcinoma or reticuloses, or may arise spontaneously, and virus particles of the papova group have been seen on electron microscopy.
4. *Kuru*—Common among the Fore people in New Guinea. Factors in propagation of the disease are an infective agent, a genetic inheritance and a mode of life which helps to spread the disease.

## 13. INFECTIOUS MONONUCLEOSIS (Glandular Fever)

**Etiology:** *Age*—Incidence highest among adolescents and young adults *Causative virus*—Epstein-Barr virus. *Mode of spread*—Exact mode of transfer uncertain, kissing has been implicated as a cause of spread of the disease. Cases usually occur sporadically, although epidemics may be encountered in closed communities such as student hostels.

*Incubation period*—10-14 days.

**Clinical types:**

1. GLANDULAR TYPE:
   (a) *Stage of invasion*—Onset usually insidious, sometimes abrupt. Malaise, headache and fever for 1 to 5 days. Tonsillitis common. An early diagnostic sign consists of an eruption of multiple pinpoint petechiae on the soft palate near the junction of the hard palate. Relative bradycardia. This stage lasts for 3-8 days.
   (b) *Stage of eruption*—Pinkish maculo-papular rash on fourth to tenth day, mainly on front of trunk, may appear in crops Palatal petechiae. Fever continues. This phase lasts for 10-14 days. Eruption disappears before glands enlarge.

injections are given on consecutive or alternate days. This should be followed by active and passive exercises carried out to limit of tolerance. (b) Low sciatica—Stretching of sciatic nerve, and injection of novocaine into, or as near as possible to the sheath of the nerve.

B. SCIATICA DUE TO HERNIATED INTERVERTEBRAL DISC—

1. *Conservative treatment*—Complete rest in bed in supine position with only one pillow for 3-6 weeks. When pain is relieved, plaster jacket to immobilise the lumbar spine completely for 3-6 months. After this the jacket is removed, and a lumbar corset worn at all times during the day.
2. *Operative treatment*—Indications—(i) Acute and incapacitating symptoms not relieved by rest in bed or even immobilisation in plaster jacket. (ii) Quick recurrence of symptoms. (ii) Evidence of large prolapse causing pressure on cauda equina, or clinical evidence of severe root compressions shown by marked motor and sensory changes. Operation consists of hemilaminectomy, removal of the protrusion, and curetting out nuclear material from the central part of the disc. It is the most effective cure.

C. SCIATICA DUE TO INFLAMMATION OF MUSCULAR AND FASCIAL STRUCTURES—Rest, local application of heat, and massage. If tender nodules, injection with 2% procaine solution. Treatment of sepsis.

## 27. BRACHIAL NEURALGIA

**Definition**—The term is applied to conditions which cause pain and paraesthesiae in the upper limbs and/or shoulder girdles with or without neurological signs.

**Causes and Differential Diagnosis:**

**1. Cervical spondylosis—**

SYMPTOMS AND SIGNS—fall into five main groups—

(a) *Radicular symptoms*—due to compression of one or more nerve roots. In acute disc protrusion sudden severe pain in neck and referred in the distribution of the compressed nerve. Neck held rigid and sometimes flexed towards side of lesion. In insidious onset burning or tingling sensation sometimes accompanied by pain radiating down the upper limb. Motor symptoms usually slight or absent. Usually some diminution of appreciation of light touch and pinprick within the

2. *Disorders causing membranous pharyngitis*—Acute tonsillitis, diphtheria, Vincent's angina, acute leukemia, agranulocytosis, aplastic anemia. Clinical and bacteriological studies will help to distinguish.
3. *Diseases with rash*—Rubella may be simulated since posterior cervical glands are often palpable, and drug reactions because of rash, fever, joint pains, lymph node enlargement and lymphocytosis.
4. *Infective hepatitis*—Presence of fever but no sore throat or rash. Jaundice well developed and persistent. Liver enlarged but not tender. Leucopenia.
5. *Acute abdominal disorders*—such as acute appendicitis in cases presenting with acute abdominal pain.
6. *Diseases of nervous system*—Benign lymphocytic meningitis, encephalitis and polyneuritis must be distinguished from cases with nervous system involvement.
7. *Toxoplasmosis*—because of fever, sore throat and lymph node enlargement and lymphocytosis with atypical lymphocytes. Diagnosis established by demonstration of antibodies and occasionally by lymph node biopsy.
8. *Cat-scratch disease*—Benign enlargement of regional group of lymph nodes with primary lesion at site of inoculation in 25-50 per cent. History of cat-scratch or close contact with cat Fever and malaise. Diagnosis confirmed by intradermal test using heat inactivated pus from a known patient.

B. Disorders with similar blood picture—

1. *Acute lymphatic leukemia*—Immature lymphocytes, high total count, anemia and thrombocytopenia and negative Paul-Bunnell test.
2. *Acute infectious lymphocytosis*—Mature lymphocytes and negative Paul-Bunnell test.
3. *Miscellaneous*—Atypical lymphocytes resembling those of infectious mononucleosis though in smaller numbers appear in viral hepatitis, serum sickness, Hodgkin's disease, rubella, brucellosis, toxo-plasma, cytomegalo virus or adeno virus infection.

**Complications**—(a) *Common*—Severe pharyngeal oedema, antibiotic-induced skin rash, depression during convalescence. (b) *Uncommon*—(i) Neurological: Cranial nerve palsies, polyneuritis, transverse myelitis, meningo-encephalitis. (ii) Hematological: Hemolytic anemia, thrombocytopenia. (iii) Renal: Glomerulonephritis, interstitial nephritis. (iv) Cardiac—Myocarditis, pericarditis. (v) Pulmonary: Interstitial pneumonitis. (c) *Rare*—Ruptured spleen, respiratory obstruction, arthritis, agranulocytosis, agammaglobulinemia.

**2. Cervical rib syndrome—**

In this condition, compression of the 8th cervical and 1st dorsal root by enlarged transverse process or a small rib or fibrous band arising from the 7th cervical vertebra may result in pain and paraesthesia along the inner border of the forearm and hand which may be aggravated by raising the arm above the head.

CLINICAL FEATURES—Any combination of the following syndromes—(1) *Vascular syndrome*—(a) *Arterial manifestations*—(i) attacks of recurrent coldness in the arm and digitis, with pallor and sometimes cyanosis. (ii) Ischemia and pain in the limbs, and small areas of gangrene, due to partial or complete occlusion of the artery. (b) *Venous obstruction*—Axillary thrombosis. (ii) *Neural manifestations*—(i) Sensory—pain and pins and needles or numbness in hand and fingers, usually of ulnar distribution. Nerves become tender to pressure. (ii) Motor—rare. Wasting of muscles of thenar eminence supplied by median nerve, general wasting of interossei and main-en-griffe. (d) *Muscle spasm or areas of tenderness*—of shoulder girdle muscles may develop.

*X-ray*—of the root of the neck may or may not reveal an enlarged transverse process or cervical rib.

**3 Fibrositis, periarthritis and arthritis of the shoulder—**

Diseases of shoulder joint and its surrounding structures should be considered. Pain referred to the shoulder, to arm, or to region of elbow, associated with loss of range of movement or pain on movement.

**4. Lesions of brachial plexus and median and ulnar nerves—**

(a) *Brachial neuritis* (Neuralgic amyotrophy)—may follow injury, operation, inoculation or specific fever. Pain is usually the first symptom, often severe and of sudden onset, followed after several days or few weeks by weakness and wasting of muscles, especially those innervated by C5 and C6 cord segments. Sensory loss is mild or absent and there are usually few or no constitutional symptoms. Recovery is slow.

(b) *Carpal tunnel syndrome*—Pain and paraesthesia involving the flexor aspect of the wrist and those fingers supplied by the median nerve. There major clinical signs are—(i) Hypesthesia restricted to median-nerve distribution in the hand. (ii) Tinel's sign, a tingling

aggerated lumbar lordosis, neck retraction and abdominal rigidity. (b) *Muscle spasm*—Spasms often involve facial muscles producing the typical appearance of raised eyebrows, tightly closed eyes and drawing back of the lips to expose clenched teeth (risus sardonicus). In more severe cases painful muscle spasms also occur from time to time, either spontaneously or in response to stimuli such as loud sounds, injections, movements and attempted naso-gastric intubation. Spasms of erector spinae muscles increase spinal extension producing opisthotonos. Pharyngeal spasms produce dysphagia and spasms of the larynx and respiratory muscles may cause asphyxiation or respiratory arrest. The lower limbs are usually extended while the upper limbs are flexed. Paroxysmal increases in tone in all the affected muscle groups produce uncoordinated spinal convulsions, a form of diffuse spasm. Retention of urine is frequent. Tremor is not uncommon.

SYMPTOMS DUE TO SYMPATHETIC OVERACTIVITY—Patients with severe tetanus may develop cardiac arrhythmias such as tachycardia, bradycardia, etc., hypertension or hypotension, demarcated peripheral vasoconstriction, exaggerated pressor response to tracheal irritation, increased metabolic rate, pyrexia, excessive sweating and salivation. These symptoms are particularly severe in the elderly and in drug addicts.

**Clinical variants:**

1. *Local tetanus*—Mild form in which stiffness remains confined to the injured limb, sometimes to a single muscle. Generalized tetanus may begin with localised manifestations followed by ascending or descending spinal and medullary involvement.
2. *Ascending form*—Local spasm of muscles in the vicinity of the wound, spreads to neighbouring muscles and to limbs, head and trunk. After recovery the original muscle spasm may persist for days or weeks. May be the result of immunization.
3. *Cephalic tetanus*—results from head injuries and infections of the eye and orbit. One or more of the cranial nerves III, IV, VI, VII and XII may be involved with spasm and apparent paralysis of the muscles which they supply, together with features of generalised tetanus. When pharyngeal muscles are involved selectively dysphagia caused by spasms may be induced by attempts to drink (hydrophobic tetanus).

# 7. The Urinary System

## 1. THE URINE

### I. General characters—

A. **Volume**—varies with amount of fluids ingested, perspiration, etc. Normal average for adult 1,200-1,500 ml. or 40-50 oz.

**Polyuria**—

A. TRANSIENT POLYURIA—

(1) *Induced or therapeutic*—(a) Ingestion of large amounts of fluids. (b) Alcohol, tea, coffee, acidifying salts like citrates or tartrates, spices, large amounts of sugar. (c) Diuretics. (d) High protein diet.

(2) *Spontaneous*—(a) Due to nervousness or after a nervous attack, e g. examination, neurasthenia, after an attack of epilepsy, migraine, asthma, angina pectoris or paroxysmal tachycardia. (b) Hydronephrosis with periodic emptying of renal sac. (c) Attack of malaria, during the cold stage. (d) During convalescence from fevers like enteric. (e) Diminution or disappearance of oedema, e g. recovery from acute nephritis, cirrhosis of liver. (f) Post-anuric diuresis. (g) Crisis of chronic nephrosis.

B. CONTINUED POLYURIA—

(1) *Cranial diabetes insipidus* (See chapter 5)

(2) *Nephrogenic diabetes insipidus*—(i) Familial. (ii) Acquired—(a) Metabolic—Hypercalcemia, hypokalemia. (b) Post-obstructive uropathy. Infections (pyelonephritis). (c) Toxic—lithium, demeclocycline. (d) Solute excess (glucosuria). (e) Chronic renal disease—polycystic disease, amyloidosis, sickle cell anemia, sarcoidosis.

(3) *Primary polydypsia*—(i) Idiopathic. (ii) Psychotic states.

OLIGURIA—Diarrhoea, fevers, decompensated heart disease, glomerulonephritis, during accumulation of fluid in serous cavities, uremia.

**Complications:** 1. *Respiratory*—Bronchopneumonia common cause of death, results from aspiration of stomach contents, blockage of airways by sticky secretions and lung collapse. 2. *Due to spasms*—Spasms can tear muscles and even avulse their insertions, with subsequent articular and periosteal calcification and myositis ossificans. Wedge fracture of thoracic vertebrae can also result from spasms. 3. *Miscellaneous*—Hyperpyrexia, fluid and electrolyte disturbances, especially dehydration which may contribute to the risk of deep vein thrombosis and pulmonary embolism; paralytic ileus, development of a catabolic state, and side-effects of drugs.

**Prognosis:** can be assessed from following—

1. *Type of infection*—Neonatal and puerperal tetanus carry a very bad prognosis. 2. *Type of patient*—Prognosis bad in elderly and drug addicts. 3. *Frequency and severity of spams.* 4. *Incubation period*—Mortality higher in incubation period is short. 5. *Period of onset*—Interval of less than 48 hours between the first symptom (usually trismus) and the first spasm, carries double or treble the mortality. 6. *Complications*—such as sympathetic overactivity, hyperpyrexia and respiratory infections are associated with bad prognosis.

**Management:**

1. *Wound treatment*—Continued release of tetanus toxin from the wound must be prevented by thorough debridement and administration of antibiotics in large doses, e.g., benzylpenicillin upto 10 Mu/day for atleast 4 days. Human tetanus immune globulin (HTIC) must be given before starting either of these measures.
2. *Neutralization of unbound tetanus toxin*—HTIG 600-1000 u IM or 10,000 u antitetanic serum (ATS) IV after testing for sensitivity. Intrathecal HITG has been tried in doses of upto 250 u.
3. *Control of painful rigidity and spasms*—(a) Provocative stimuli such as noise, unnecessary movement, injections should be kept to minimum. (b) Sedatives and muscle relaxants—Diazepam IV in a starting dose of 0 2 mg/kg body weight (and about 2 mg. for a 3 kg infant) every 4 hours with gradual increase in dose until spasms are controlled, or combination of phenobarbitone 1 mg/kg and chlorpromazine 0.5 mg/kg body weight at 6-hourly intervals by any convenient route and increased until effective. Each drug is administered every 3 hours.

G. **Specific gravity**—Generally varies with quantity of urine. Normal range 1,017 to 1,020. *Low*—in chronic interstitial nephritis, diabetes insipidus, functional nervous disorders. *High*—in fevers and parenchymatous disease of the kidney. In any form of nephritis, a sudden fall without a corresponding increase in quantity of urine, may foretell approaching uremia. When urine is not highly coloured or when the quantity is above normal it is suggestive of diabetes mellitus. Diseased kidneys lose partially or completely their ability to respond to the need of the body with the result that the urine has about the same specific gravity throughout the day.

II. **Chemical examination**—

1. PROTEINS—Urine may contain mostly albumin (selective proteinuria) or may contain larger molecules as well (non-selective proteinuria). Excretion mainly of albumin signifies a glomerular lesion.

*Causes of proteinuria*—

(a) *Physiological*—Amount of protein excreted is small and the condition is temporary. (a) Orthostatic or benign—usually in older children and adolescence. Urine sample passed on waking is negative for proteinuria while urine passed after 2 hours ambulation is positive. Usually increased by exercise. Amount of albumin varies from a trace to 2-3 g/day. (b) Mental strain. (c) Prolonged exposure to cold. (d) After a meal rich in proteins (alimentary proteinuria). (e) Pregnancy. (f) Pre-menstrual. (g) During first 10 days after birth.

(b) *Pathological (persistent) proteinuria*—

(i) *Glomerular lesion*—e.g. Lipoid nephrisus in children, chronic membranous glomerulopathy, membranoproliferative glomerulonephritis.

(ii) *Tubular lesions*—Fanconi syndrome, Wilson's disease, cystinosis, oculo-cerebro-renal syndrome, sarcoidosis, renal tubular acidosis, cadmium toxicity, medullary cystic disease, pyelonephritis (some cases), Balkan nephropathy, renal transplants.

Systemic diseases that may present as asymptomatic albuminuria—Diabetes mellitus, amyloidosis, hypertension, gout, SLE.

**Types of serum reactions:**

1. SERUM SICKNESS (ordinary serum disease)—usually after latent period of 7 to 14 days—
   (a) *Fever*—common, usually moderate.
   (b) *Skin rash*—usually starts at site of injection and may be confined to this area—"local serum sickness" or becomes generalised. Usually urticarial, may be scarlatiniform, morbilliform, circinate, gyrate or mixed. Intense itching. Serum sickness lasts from few hours to 2 to 3 days.
   (c) *Generalised lymphadenopathy*—commonly present; the involved nodes may be tender particularly in the area associated with the site of serum injection. After other symptoms have subsided, nodes often remain enlarged for several days. Slight enlargement of spleen may occur.
   (d) *Arthritis*—in about half the cases, usually pain and stiffness. Sometimes swollen, hot and tender. Knees, ankles, elbows, wrists and small joints of hands commonly involved.
   (e) *Oedema*—more common in children. Face, sacral and pretibial regions, ankles, hands and arms. Oliguria, albuminuria and cylinduria with rarely nitrogen retention.
2. SERUM SHOCK (accelerated and immediate reaction)—usually in those previously injected with serum. Reaction may occur within an hour or 2 or 3 days. Severe constitutional symptoms like rigor, vomiting and collapse may occur.
3. ANAPHYLAXIS—In patients naturally sensitive to horse proteins or those sensitised due to previous serum injection. Symptoms may come on during injection—
   (a) *Collapse*—Tightness in chest, restlessness, pallor, thready pulse. Soon syncope, cyanosis and shock. Death may occur within a few minutes.
   (b) *Skin manifestations*—Itching and rapidly progressive urticaria or angioneurotic oedema. The oedema may be conspicuous round the eyes or may involve oropharyngeal or laryngeal area and pose a threat to life.
   (c) *Gastro-intestinal*—Nausea, vomiting, diarrhoea
   (d) *Respiratory*—Cough with frothy expectoration, wheezy and distressed breathing, cyanosis, prostration, sweating, respiratory failure and coma.

(c) *Hemosiderin*—Dark yellow pigment containing iron, occurs in hemochromatosis and pernicious anemia.
(d) *Porphyrin*—in congenital or acquired porphyrinuria.
(e) *Melanin*—in most cases of melanotic tumors.
(f) *Alkaptone bodies*—In alkaptonuria, urine turns reddish brown to brownish black on standing and strongly reduces copper.

5. DRUGS—Most poisons are eliminated in urine and their detection is useful in toxicology, e.g. lead, mercury, quinine.

6. MYOGLOBINURIA—Myoglobin may be found in the urine after severe crushing injuries of muscles or as a result of degeneration of voluntary muscles.

III. **Microscopic examination—**

1. CRYSTALS—

*In acid urine—*

*Uric acid*—Roset-like clusters of prism and whet stone and rhombic plates. Of no significance unless it occurs in fresh urine. Their presence suggests stone in kidney or bladder or abnormal uric acid metabolism as in gout.

*Amorphous urates*—common in fevers. Fine yellowish or colourless granules or rarely slender prisms.

*Calcium oxalate*—"envelope" crystals. Causes—ingestion of vegetables rich in oxalic acids such as tomatoes, spinach. asparagus and rhubarb; digestive disturbance with fermentation of carbohydrates, neurasthenia. Their presence in fresh urine, especially if they are clumped in small masses, is suspicious of calculi.

*Leucine and tyrosine*—indicate autolysis of tissue proteins. Clinically most frequent in acute yellow atrophy or phosphorous poisoning.

*Cystine*—Colourless refractile hexagonal plates with well defined edges. Traces in normal urine. Cystinuria is due to obscure abnormality of protein metabolism and strongly predisposes to renal or cystic calculi.

*Sulphonamides*—Crystal forms of certain derivatives of sulphonamide may precipitate out from the urine.

*Fat globules*—After ingestion of large quantities of cod liver oil or other fats, phosphorus poisoning and chronic parenchymatous nephritis.

# 9. Tropical Diseases

## 1. MALARIA

**Etiology**—(i) *Age and sex*—All ages, sexes equally affected. (ii) *Immunity*—Repeated infection with a strain of plasmodia may result in the development of some immunity. (iii) *Transmission*—Requirements for transmission of infection are presence of suitable anopheline mosquito, reservoir of malaria infection in the area, suitable non-immune or partly immune hosts and an environmental temperature with suitable humidity. (Malaria usually does not occur at altitudes of over 6,000 feet). Infection is normally transmitted to man by the bite of an infected mosquito, rarely it may occur across the placenta, or as a result of blood transfusion, or syringe-transmitted malaria among drug addicts.

**Clinical features of falciparum malaria:**

**Acute attack:**

*Incubation period*—10-15 days.

*Onset*—Lassitude, anorexia, headache, chilliness for several days before actual attack.

*Paroxysm*—May be divided into 3 clinical stages—(a) *Cold stage*—Patient shivers from head to foot, his teeth chatter and he covers himself with blankets. The temperature goes on rising. The stage lasts for about half hour. (b) *Hot stage*—Shivering abates and gives place to a feeling of intense heat, the patient throwing off the blankets. Flushed face, headache, vomiting, dry and burning skin. Temperature rises to 104°F or more. The stage lasts for 3-4 hours. (c) *Sweating stage*—Patient breaks into profuse perspiration, and the temperature rapidly declines with feeling of relief.

*The interval*—During the period between the subsidence of fever and appearance of next paroxysm patient feels well and the temperature is normal though occasionally it may show some rise. Paroxysms occur at interval of 72 hours in quartan malaria and of 48 hours in the other types.

*Relapse*—Recurrence of clinical signs and symptoms of malaria and the reappearance of parasites in peripheral blood following a period of quiescence after control of primary attack.

*'Renal failure casts'*—Broad and large casts probably originating in distal tubules.

*Red cells casts*—are pathognomonic of glomerular bleeding.

*Malignant cells*—may be visible as syncitia with prominent nuclei in stained filter preparations.

*"Telescoped urinary sediment"*—Presence of more than 2 types of casts in a single urinary specimen together with leucocytes and erythrocytes usually implies lupus nephritis.

IV. **Bacteriological examination**—

*Bacteria*—most commonly found are E. Coli, Pseudomonas pyocyaneus, Staphylococcus aureus, Proteus vulgaris, Klebsiella pneumoniae and Streptococcus faecalis. A clear relationship has been demonstrated between in vitro sensitivity of the organism and the outcome of treatment, and laboratory control of chemotherapy improves the chances of successful treatment.

*Spirochetes*—Leptospira icterohemorrhagica.

*Ova and parasities*—Trichomonas vaginalis and ova of oxyuris vermicularis and of schistosoma hematobium. Larvae of filaria. Scolices and hooklets of hydatid cysts.

*Spermatozoa*—sometimes found following nocturnal emissions, convulsions or prostatic massage.

V. **Special tests**—

*Pregnancy test*—Concentration of human chorionic gonadotrophin (HCG) increased (1-5 IU/ml.) within one week after the first missed period.

*Urinary free cortisol, catecholamines, etc.*—See Chapter 5.

## 2. GLOMERULONEPHRITIS (GH)

**Etiology and pathogenesis:** Glomerular inflammation can be caused either by conditions which appear primarily to involve the kidneys or conditions in which the glomerular involvement is secondary to widespread systemic disease. The hallmark of glomerular disease are proteinuria, hematuria, hypertension and impairment of renal function.

Immunity, inflammation and coagulation all play a part in pathogenesis of GN. The pathogenic mechanisms are:

A. ANTI-GBM ANTIBODY DISEASE—Antibodies directed against some component of glomerular basement membrane are formed either spontaneously or following a virus infection,

3. *Response to antimalarial therapy*—If an adequate dose of an active antimalarial drug abolishes parasitemia but fails to reduce fever within 2-3 days, a concomitant other infection should be suspected.

**Management:**

Antiparasitic treatment (Adult dose)

*Uncomplicated attacks of falciparum malaria*

| | *Chloroquine-sensitive areas* | *Chloroquine-resistant areas* |
|---|---|---|
| Semi-immune | 600 mg chloroquine p.o. | 1 g sulfadoxine with 50 mg Pyri. p o. |
| Non-immune Day 1 | 600 mg Chl. p.o. 600 mg Chl. 8 hours later | 600 mg quinine p.o. every 12 hours. |
| Day 2 | 300 mg Chl. p.o. | 600 mg quinine every 12 hours |
| Day 3 | 300 mg Chl. p.o. | 600 mg quinine every 12 hours |
| Day 4 | 300 mg Chl. p.o. | 1,500 mg sulphadoxine plus 75 mg Pyri. p.o. |

*Complicated attacks of falciparum malaria**

650 mg quinine dihydrochloride IV every 12 hours until oral therapy feasible or

| | |
|---|---|
| 200 mg Chl. (5 ml) IV every 12 hours until oral therapy feasible followed by: Oral Chl. for 3 days | followed by: Oral quinine 600 mg. b.d. for 3-5 days *plus* final dose of Sulphadoxine 1,000 mg + Pyri. 75 mg. |

*Vivax, ovale and malariae malaria*

| | |
|---|---|
| Day 1 | 600 mg Chl. p.o. |
| Day 2 | 300 mg Chl. p.o. |
| Day 3 | 300 mg Chl. p.o. |
| Day 4 | 7.5 mg primaquine b.d. for 14-21 days |

Chl = Chloroquine base. Pyri = Pyrimethamine.

* Complicated attacks of falciparum malaria are only seen in non-immunes and require parenteral therapy (infusion time = 2 hours; infusion volume = 250 ml.).

*Supportive treatment*—(a) *Cerebral oedema*—Carticosteroids and/or mannitol. Dexamethasone 6-8 mg or hydrocortisone 100 mg IV every 6 hours until consciousness is regained. Con-

HISTOLOGICAL :

1. *'Minimal change' nephropathy* (Lipoid nephrosis)—Glomeruli appear normal on light microscopy. On electron microscopy the only abnormality is the fusion of the delicate foot processes (podocytes) of the epithelial cells. On immunoflourescence, specific antisera reveal no immunoglobulins, no complement and no fibrinogen. It is a disease of children and is responsible for only about 10% of adult cases of nephrotic syndrome.
2. *Focal glomerular sclerosis and hyalinosis*—represent a number of different entities in which there is segmental and focal progressive obliteration of the glomeruli. This is usually accompanied by steroid-resistant nephrotic syndrome, and at times by proteinuria or hematuria. Most cases are idiopathic.
3. *Membranous nephropathy*—There is uniform thickening of glomerular capillary walls without cellular proliferation. Granular IgG and C3 immunofluorescence is usually observed. Oedema and proteinuria are the presenting features. In majority the course tends to be slowly progressive terminating in uremia in 5-10 years.
4. *Acute proliferative glomerulonephritis*—This is the most common form of primary glomerulonephritis and is named proliferative because on biopsy there is a diffuse increase in glomerular cellularity due to proliferation of mesangial cells and sometimes endothelial cells. Classically associated with streptococcal infections of throat or skin. There is marked mesangial and endothelial cell proliferation with polymorphonuclear leucocyte infiltration. Immunofluorescent staining of IgG and C3 is obvious.
5 *Crescentic glomerulonephritis* (rapidly progressive glomerulonephritis)—is a severe form of proliferative nephritis, also labelled extracapillary because it involves Bowman's capsule, giving rise to crescent formation. Some patients present with irreversible oliguria but more commonly the disease runs a rapidly progressive course with hypertension, and oedema, terminating in uremia in about 18 months.
6. *Mesangial IgG/IgA* (Berger's disease)—is a form of proliferative glomerulonephritis which is characterised by deposition of IgG and IgA in the glomerular mesangium. It occurs commonly in 15-25 years age group, predomi-

**Clinical Features:**

*Onset*—(i) Enteric like. (ii) Malarial. (iii) Insidious—indefinite ill-health and lassitude with attacks of irregular fever.

*General appearance*—May be emaciated but usually not anemic, dry and sparse hair, pigmentation of skin around malar bones and temples and around the mouth (hence labelled black sickness), protuberant abdomen, legs thin with sometimes oedema of feet.

*Alimentary system*—(i) Spleen—usually enlarges downward about one inch per each month of the disease, ultimately it may enlarge upto the pelvis, non-tender. (ii) Liver—enlarges to a lesser degree but commonly reaches more than half-way to the umbilicus. Neither painful nor tender. Sometimes gross enlargement without appreciable enlargement of spleen. (iii) Appetite usually good. (iv) Chronic diarrhoea attributable to infection of lymphoid tissue in intestine. (v) Jaundice may occur in late stages and is of bad prognosis.

*Fever*—No characteristic form except double diurnal rise; remittent or intermittent, lasts 2-6 weeks or longer followed by apyrexia. Some cases may be apyrexial. A characteristic feature is that the patients retain their appetite and are active inspite of fever.

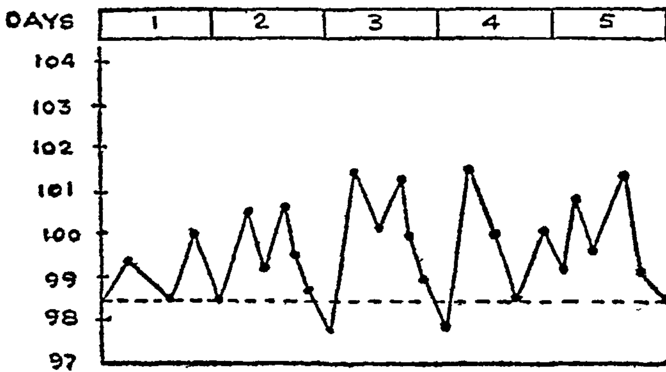



Fig. 9.1 Double rise of temperature in kala-azar.

*Cardio-vascular*—B.P. low, haemic murmur, tachycardia.

*Respiratory*—Cough, congestion of lungs, bronchopneumonia due to superadded infection.

*Hemopoietic system*—Hypersplenism resulting in anaemia, leucopenia and thrombocytopenia. Purpura and abnormal bleeding due to thrombocytopenia. Hypergammaglobulinemia due to marked rise in IgG (as high as 40 g/litre).

3. *Impaired renal function*—Oliguria. Acute renal failure develops in a small proportion of patients.

**Laboratory findings:**

1. *Urine*—Volume reduced, dark in colour or smoky when fresh, tea-coloured after hemolysis. Proteinuria variable, rarely more than 2 5 gm. per day. Red cells and red cell casts. Also white cells, white cells casts and granular casts.
2. *Evidence of streptococcal infection*—Antistreptolysin O (ASO) titre more than 1:3,000.
3. *Hematology*—Polymorphonuclear leucocytosis, raised E.S.R.
4. *Biochemical*—Blood urea and ereatinine moderately raised. Serum complement level depressed.
5. *Osmolality*—of diagnostic help because osmolality of urine is often appreciably higher than that of plasma in acute nephritis in contrast to other forms of acute renal failure.
6. *Renal biopsy*—Indications—(i) Unusually protracted course, especially if accompanied by renal failure. (ii) Suspicion of multisystem disease. (iii) Transition to nephrotic phase. (iv) Persistent hypocomplementemia.
7. *Serum complement estimation*—A low serum complement (usually measured as $C_3$ component) is present in some forms of nephritis.

**Differential Diagnosis:**

1. *Focal nephritis*—Hematuria occurs at height of infection and rapidly passes off.
2. *Acute exacerbation of chronic glomerulonephritis*—History of previous attack of nephritis or if no history diagnosis suggested by onset of hematuria a day or two after an upper respiratory infection.
3. *Nephrotic syndrome*—See page 635.
4. *Pyelonephritis*—Usually associated with fever, dysuria and frequency; more white cells in urine than red cells, presence of organisms in urine.
5. *Polyarteritis nodosa*—Pyrexia persistent for more than 2-3 days and continuous hematuria. Telescoped urinary sediment.
6. *Henoch-Schonlein nephritis*—This is associated with purpuric skin rashes, arthropathy and intestinal colic with

IV daily for 10 days; the course is repeated after 10 days. Less potent than antimonials but may be adequate for the less resistant forms, or useful for alternating with antimonials when repeated courses are required. Danger of primary trigeminal neuropathy.

(c) *Antibiotics*—Amphotericin B found effective in some advanced infections. 1.0 mg./kg. body weight IV in 5% glucose solution on alternate days over 4-6 hours for 45-70 days Toxic but useful in patients resistant to antimonials and diamidines

2. SPLENECTOMY—only if spleen is much enlarged and several courses of treatment have been unsuccessful.

**Other leishmania infections in man:**

| *L. species* | *Disease* | *Clinical features* |
|---|---|---|
| L. tropica ... | Oriental sore (Delhi boil) | Infection confined to the skin |
| L. mexicana .. | Chicle ulcer | Infection of skin |
| L. braziliensis ... | Espundia | Infection starts in skin and later spreads to mucocutaneous junctions of nose and mouth |

## 3. AMOEBIASIS

**Etiology**—(a) *Reservoir of infection*—E histolytica is essentially a parasite of man but is occasionally found in rats, dogs and rarely other animals. (b) *Mode of transmission*—Infection is generally acquired by swallowing cysts of the parasite in foodstuffs faecally contaminated by unclean habits or by agency of flies or by use of human faeces as fertiliser; rarely contamination of water. (c) *Age*—Symptomatic amoebiasis occurs mainly in adults, children suffer much less frequently.

**Symptoms:**

1. *Asymptomatic carriers or cyst passers*—In about 50% of cases hepatitis or hepatic abscess may develop without any intestinal symptoms. Asymptomatic amoebiasis includes both non-invasive and subclinically invasive infections.
2. *Mild symptomatic infection*—
   (a) Gastro-intestinal—Constipation alternating with diarrhoea; nausea, gaseous distension, pain and tenderness in right iliac fossa.
   (b) Nervous—Dull headache, muscle pain, insomnia, depression, subnormal temperature.
   (c) Circulatory—Flushing and sweating, sensation of faintness, tachycardia.

Mid-morning—one cup tea or coffee with milk and sugar and one plain biscuit.

Lunch—Small helping of meat, chicken, fish or 2 eggs.
Small helping of vegetables.
One medium sized potato.
Milk pudding or curds.

Tea—2 thin slices of bread with jam or honey or sandwiches with tomato or lettuce or cucumber.
Buttermilk or tea.

Dinner—One thin slice bread or one chappati.
Jam or jelly.
Fruit fresh or tinned.
One cup tea or coffee.

Daily allowance—3/4 pint milk, 2-1/2 oz. butter, 2 oz. sugar.

4. *Antibiotics*—Penicillin—500,000 units IM 6-hourly or procaine penicillin 600,000 units daily to destroy any residual hemolytic streptococci. Erythromycin 250 mg. q.d s. if penicillin is not tolerated.

5 *Management of complications*—(i) Convulsions—I.V. Diazepam 10 mg. slowly, if fits recur phenytoin sodium 100 mg. b.d. I.M. (ii) Cardiac failure—Salt and water restriction. Digitalis and frusemide. Venesection and hypertensive drugs when there is considerable rise of pressure associated. (iii) Acute renal failure—See renal failure.

6. *Dialysis*—if unconscious, twitching or deteriorating patient, rapidly rising blood urea or rising serum potassium. In children peritoneal dialysis is preferred to hemodialysis.

7. *After treatment*—(a) Gradual return to normal diet; dietetic restrictions not necessary after complete recovery. (b) Iron for anemia. (c) Eradication of any focus of sepsis such as septic tonsils or infected dental roots but only after 4-6 months. (d) Protection against infections and chills.

## II. Persistent glomerulonephritis

**Etiology**—May occur at any age but mainly in males. Follows an attack of acute glomerulonephritis, or presents without previously known or recognised acute glomerulonephritis. Recurrent exacerbations of hematuria and hypertension with wide fluctuations in blood urea suggest increasing likelihood of developing persistent glomerulonephritis.

| | *Amoebic dysentery* | *Bacillary dysentery* |
|---|---|---|
| Frequency of stools | Not so much | Marked |
| Fever ... | Rare | Usual |
| Toxemia ... | Slight or none | Present |
| Abdominal pain and tenderness | Variable, may be localised to right side | Severe, localised to left side |
| Tenesmus ... | Moderate or absent | Usually severe |
| Complications and sequelae | Many | Few |
| *Stools*— | | |
| Macroscopic .. | Bulky<br>Offensive faeces intermingled with dark blood and mucus resembling sago grain | Scanty<br>Non-offensive red blood and viscid mucus resembling red-currant jelly |
| Microscopic ... | Not very cellular, red cells in clumps<br>Macrophage cells scanty<br>Degenerated lymphocytes, active E. histolytica and Charcot-Leyden crystals | Very cellular, discrete R B Cs.<br>Macrophages present<br>Polymorphs |
| *Sigmoidoscopy* (in subacute stage) | Raised button like ulcers or oval irregular flask-shaped ulcers or numerous minute ulcers (mouse-eaten appearance); normal mucous membrane in between ulcers | Ulcers seldom seen, or serpiginous ulcers; mucous membrane inflamed and readily bleeds |

**Complications** (*Other manifestations of amoebiasis*):

1. HEPATIC:

**(i) Hepatitis and liver abscess—**

*Predisposing factors*—More common in adult males, excessive alcohol, malnutrition or trauma over hepatic area. History of dysentery may or may not be obtained.

CLINICAL FEATURES—

*Onset*—insidious with no symptoms till abscess is large, or symptoms of chronic ill-health, or sudden episode suggestive of right basal pneumonia, or sometimes acute

DIFFERENTIAL DIAGNOSIS:

1. *Essential hypertension or nephrosclerosis*—

| | *Chronic nephritis* | *Essential hypertension* |
|---|---|---|
| History of acute nephritis .. | Some years ago | No such history. |
| Age ... | May occur between 20 and 30 years | Rare before 30 years. |
| Appearance of patient .. | Pale and ill, inert | Good colour, alert. |
| Oedema .. | Slight oedema without breathlessness | Oedema absent unless breathlessness (failure). |
| Blood .. | Secondary anemia with low colour index common | Anemia rare. |
| B.P. ... | More constant | More labile. |
| Urine—<br>Sp gravity ... | Constant 1010 or less | Low but varies according to fluid intake and loss. |
| Casts .. | Epithelial and granular | Granular. |
| Renal function tests | Moderate to marked impairment | Slight impairment |
| Renal biopsy .. | Gross changes of chronic glomerulonephritis | Changes of benign hypertension. |
| Termination ... | Renal failure common | Cerebral hemorrhage or cardiac failure more often. |

2. *Chronic pyelonephritis*—(i) Urine culture shows organism though these may appear intermittently. (ii) History of recurrent rigors and fever, often with loin pains. (iii) Urinary excretion of white cells much more than of red cells. (iv) Pyelography will show distortion of the pelvi-calyceal pattern.

3. *Renal tuberculosis*—should be considered in any patient with unexplained genitourinary symptoms or persistent symptomless albuminuria, pyuria or microhematuria. Positive culture or guinea pig inoculation. Excretory urograms may be normal in the presence of minimal disease or may

motion. (vi) *Retroperitoneal*—It may extend into the posterior abdominal wall retroperitoneally with a swelling over the kidney region as presenting manifestation. (vii) *Other organs*—Extension to spleen or rupture into stomach, renal pelvis or vena cava, long bones and testis is known to occur.

DIAGNOSIS—

(1) *Leucocytosis*—with predominance of polymorphs.

(2) *Stools*—Positive stools are more frequent in amoebic hepatitis than in abscess. Negative faecal results do not exclude hepatic amoebiasis.

(3) *Chest radiograph*—Immobile, raised or bulging right hemidiaphragm.

(4) *Liver scan*—shows size, site and number of lesions present.

(5) *Ultrasound and CT scan*—helpful especially if aspiration is contemplated.

(6) *Serological tests*—positive in over 90% of patients.

(7) *Hepatic arteriography* (selective coeliac arteriography)—may also be of diagnostic value, especially before operation to accurately localise the abscess.

(8) *Diagnostic aspiration*—when abscess has been localised. Chocolate coloured pus, or thick yellow or foul smelling if secondary infection.

(9) *Therapeutic test*—A useful way of differentiating amoebic hepatitis from abscess may be by noting the disappearance of symptoms in the former after 3 days' treatment with emetine.

**(ii) Chronic cholecystitis.**

2. INTESTINAL:

(a) *Haemorrhage*—Usually mild, due to sloughing of bowel wall.

(b) *Perforation*—uncommon, may occur with fulminating dysentery. Commonly in region of caecum and ascending colon leading to pericolic or postcolic abscesses or general peritonitis.

(c) *Peritonitis*—(a) *Generalised*—usually fatal; may follow perforation of amoebic ulcer or rupture of liver abscess. (b) *Localised*—occurs in acute severe types, and is caused by extension of the inflammation to the serous coat over amoebic lesions.

(b) *Metabolic diseases*—Diabetes mellitus, anyloidosis, sickle cell anemia, myxoedema.
(c) *Collagen disease*—Disseminated lupus erythematosus, polyarteritis nodosa.
(d) *Mechanical causes*—Renal vein thrombosis, constrictive pericarditis, obstruction to inferior vena cava.
(e) *Drugs*—Penicillamine, gold, mercury, phenindione, trimethadone, heroin addiction.
(f) *Allergy*—to insect bites, snake bite, pollen, or plant toxins.
(g) *Infections*—Syphilis, quartan malaria, tuberculosis, staphylococcal septicemia, leprosy.
(h) *Malignancy*—Carcinoma of stomach, breast, choriocarcinoma, multiple myeloma, Hodgkin's disease.
(i) *Miscellaneous*—Toxemia of pregnancy, irradiation, multiple myeloma, anaphylactoid purpura, renal transplant, congenital and familial.

**Pathology**—The kidneys are large, pale and soft. Biopsy studies show a wide variety of histopathological changes—(a) Minimal change nephropathy is common in very young children. (b) Focal glomerulosclerosis. (c) Membranous nephropathy. (d) Proliferative glomerulosclerosis—accounts probably for the largest group of adults with idiopathic nephrotic syndrome.

**Clinical features:**

1. *Age and sex*—Two to three times more common in childhood with peak incidence at 2-3 years. In this age group there is a male:female ratio of 2 5:1, in adults sex incidence is equal.

2. *Oedema*—Oedema is peripheral involving the limbs, particularly lower limbs. In children oedema may be more obvious in the face and abdomen. Usually massive generalised anasarca, the patient almost weighing double his true weight. Intense oedema of the scrotum or vulva may occur. There may be bilateral hydrothorax. Oedema may persist for many weeks or months. Spontaneous subsidence with diuresis (nephrotic crisis) may occur, to be followed again by increase of oedema.

3. *Gastro-intestinal symptoms*—Anorexia causes severe malnutrition. Diarrhoea and vomiting due to oedema of intestinal wall.

4. *General symptoms*—Prolonged protein loss causes anorexia, lethargy, tiredness, frequent infections and muscle wasting. Dyspnoea may occur if there is fluid in the pleural cavity.

4. AMOEBIC PERICARDITIS—Amoebic abscess of left lobe may rupture into pericardium and cause acute cardiac tamponade.
5. CEREBRAL—Abscess of brain from blood-borne infection.
6. URO-GENITAL—Subacute cystitis and prostatitis, abscess of kidney, epididymis or testis, ovary or perianal region. Ulcer of urethra in male and cervix in female. E. histolytica may be found in urine if fistula between rectum and bladder. Amoebic vaginitis. Amoebic ulceration of glans penis.
7. ABSCESS OF SPLEEN.
8. CUTANEOUS—Ulceration of skin round anus, at the site of drainage of a liver abscess, round colostomy wound in a case of chronic ulcerative colitis, or sinus of an empyema.

**Amoebicial drugs:**

| *Drug* | *Dosage* | *Remarks* |
|---|---|---|
| (1) *Compounds of emetine—* | | |
| (a) Emetine hydrochloride<br>(b) Dehydro-emetine | 30 to 60 mg I.M. for 3 days for amoebic dysentery and 10 days for liver abscess.<br>Toxic effects—Anorexia, nausea, vomiting and diarrhoea. Myocarditis, cardiac irregularities, fall of B.P., dyspnoea Polyneuritis. | Indications: (i) Acute amoebic dysentery. (ii) Chronic amoebic dysentery with acute exacerbation. (iii) Hepatitis and liver abscess. (iv) Pulmonary amoebiasis (v) Amoebic granuloma.<br>Dehydroemetine less toxic than emetine. |
| (2) Metronidazole | 800 mg. t.d.s in invasive dysentery, 400 mg. t.d.s in non-intestinal amoebiasis<br>500 mg. IV in amoebic liver abscess | Can eradicate E. histolytica from both colonic and hepatic sites. |
| (3) *Tinidazole* | 600 mg. b.d for 5 days.<br>800 mg. t.d.s for 5 days in liver abscess | Gives higher blood levels than metronidazole Perhaps better tolerated. |
| (4) *Dichloracetamides* Diloxanide furoate (Furamide) | 500 mg. t.d.s. for 10 days (preferably combined with metronidazole 400 mg. t.d.s. for 5 days) | Effective in chronic amoebiasis. |
| Chlorphenoxamide (Mebinol) | 250 m.g t.d.s. for 10 days. | Useful in chronic amoebiasis. |

2. *Of conditions causing nephrotic syndrome*—Cases due to diabetes, anaphylactoid purpura, drug therapy or irradiation of the kidneys can be diagnosed from the history or other typical findings. Amyloid disease—history of chronic suppuration; positive liver or gum biopsy or renal biopsy. In thrombosis of renal vein there is evidence of inferior vena caval thrombosis or presence of only one kidney. Polyarteritis can be diagnosed from other characteristic features like fever, peripheral neuritis, etc., or positive muscle biopsy. Disseminated lupus—presence of L.E. cells in peripheral blood or bone marrow.
3. *Of generalised anasarca*—See p. 71.

**Complications:**

1. *Protein malnutrition*—can lead to wasting, striae and osteoporosis.
2. *Hypercoagulability*—Spontaneous venous and arterial thrombosis due to rise of many clotting factors in plasma including fibrinogen and factor VIII.
3. *Impaired resistance to infection*—Cellulitis, primary peritonitis with pneumococci, urinary tract infection.
4. *Acute hypovolemia*—may occasionally be severe enough to precipitate renal failure.

**Management:**

I **Of minimal change lesions—**

1. CORTICOSTEROIDS—produce rapid and complete remission with clearing of proteinuria in almost all cases. Dose—Prednisolone 60 mg/day (60 mg/metre$^2$) in children Alternate day steroid therapy (2mg/kg/day) is often effective and less likely to produce Cushingoid state. This can be continued without toxic effects for one to four weeks. Hypertension may appear during this period, and if marked indicates that there is some form of glomerular structural damage, and a biopsy, if not already done is indicated. Remission usually occurs within 4 weeks After 4 weeks, the dose of prednisolone can be gradually tapered.

2. GENERAL TREATMENT—

   (a) *Diet*—High protein diet (100-120 gm/day) to replace the drain of protein from the body. Sodium restriction (less than 1 0 gm/day) in controlling oedema especially in those patients in whom response to steroid therapy is slow or insignificant.

axillary line. All available pus should be removed. If abscess is in left lobe or presenting on lower surface aspiration should be performed through the open abdomen. (v) *Surgical drainage*—is rarely necessary.

*Perforation*—Gastric suction, IV fluids and electrolytes together with tetracycline 1 gm. daily and emetine hydrochloride in standard dosage. Surgery should be avoided. When oral administration becomes possible metronidazole should also be given.

## 4. BACILLARY DYSENTERY

**Etiology**—*Causative organism*—Four groups of shigella species S. dysenteriae, S. flexneri, S. boydii and S. sonnei. It varies from mild gastroenteritis producing slight diarrhoea to a fulminating, toxic and at times fatal illness. *Mode of transmission*—Mainly in food and by flies. Water may also be contaminated by faeces. Direct faecal-hand-oral route occurs among children. Carriers such as cooks or food handlers are occult sources of infection.

*Incubation period*—1 to 4 days.

**Clinical Features:**

1. LOCAL—
   (a) *Colic*—Frequent spasms of griping abdominal pain which start gradually, rapidly increase in intensity and then wane. Incessant desire to defaecate.
   (b) *Diarrhoea*—At first four or five. Frequency increases rapidly in a day or two. Loose and yellowish brown to start with, soon assume typical dysenteric characters. Small, no faecal matter, consisting of bloody gelatinous mucus or mucopus. The blood may vary from steaks or small lumps to large clots. In severe cases shreds of mucosa may be present.
   (c) *Tenesmus*—Passage of stool often associated with straining and burning pain in rectum and anus.
   (d) *Tenderness of large bowel*—may be present.
2. GENERAL—Moderate pyrexia, headache, malaise, anorexia, dirty tongue. As disease advances thirst, emaciation, dry sallow skin, weakness and prostration.

**Clinical types:**

1. *Mild*—Not more than 10 to 12 stools in 24 hours, little or no fever, little griping.

(i) *Corticosteroids*—for infrequent relapses and if the disease remains sensitive to steroid therapy. The drug may be given as a continuous low dosage regime, each patient should be 'titrated' for the lowest effective dose (usually 5-15 mg/day). This may eliminate the need for giving ACTH, or alternate day steroid schedule to prevent the most important side effect of steroids in children namely growth failure.

(ii) *Cytotoxic-immunosuppressive drugs*—in those who suffer frequent relapses. Cyclophosphamide 3.5 mg/kg/day for 8 weeks induces stable remission averaging about 3 years. White blood cell count should be checked weekly. Immediate toxicity of the drug is negligible but there may be long-term effects.

**II Management of patients with other histological lesions—**

Present evidence suggests that there is no point in treating nephrotic patients with corticosteroids or cyctotoxic drugs if they have on kidney biopsy any histological appearances other than 'minimal change'.

1. *Diuretics*—With mild oedema bendrofluazide 5-15 mg/day. For more severe oedema frusemide may be given in large doses (250-500 mg b.d ) or ethacrynic acid or bufnetamide. Watch must be kept against gross potassium depletion. Amiloride, spironolactone or mefruside may be used to raise plasma potassium, especially in the resistant patient with impaired renal function.

2 *Intravenous plasma*—given repeatedly with large doses of IV frusemide may be useful in lessening oedema in a nephrotic patient with very low serum albumin.

3. *Diet*—Protein intake of 80-100 g/day, and as low a sodium intake as is compatible with this, usually 30-50 mEq/day (30-50 mmol/day).

4. *Cholesterol reducing drugs*—There is increased incidence of cardiovascular complications in patients with a persistent nephrotic syndrome and abnormal lipid levels. Hence very high cholesterol levels (above 500 mg/100 ml) should be treated with cholestyramine or clofibrate according to whether the triglyceride levels are also raised or not.

## 5. CHOLERA

**Epidemiology**—*Organism*—Vibrio cholerae and El Tor biotype. As compared to V. cholerae the El Tor is hardier, remains viable much longer in water, is shed over a longer period of time, and produces a lower incidence of clinically apparent disease. *Transmitted* by food or water contaminated by faeces from a case or carrier. *Spread*—may occur from case to case through direct contact with faeces or vomitus. The domestic fly is the only important living agent of transmission. In endemic areas most cases occur in the hot humid season. Carriers of El Tor vibrio may excrete the organism for months or years.

*Incubation period*—24-72 hours.

**Clinical Features:**

1. *Stage of evacuation*—Sudden onset with (i) frequent and loose motions, first yellow soon become colourless, watery and copious with flakes of mucus—'rice water stools'. No griping or tenesmus. (ii) Copious and incessant watery vomits. (iii) Temperature—subnormal
2. *Stage of collapse*—Dehydration leading to circulatory collapse, agonising muscle pains and urinary suppression quickly ensue and are related to biochemical changes of water depletion due to diarrhoea and vomiting, sodium depletion, potassium loss, and acidosis caused by loss of bicarbonate in the stools. If hypotension persists long enough, renal damage in the form of acute tubular necrosis may occur.
3. *Stage of reaction*—Cessation of vomiting, diminution in number of stools, improvement in pulse and B P. Skin temperature returns to normal but in unfavourable cases there may be fever or even hyperpyrexia.

CLINICAL VARIETIES—

1. *Mild or ambulant*—Diarrhoea and malaise, attack subsides without stage of reaction.
2. *Fulminating*—Toxemia causes rapid death.

DIAGNOSIS: Presence of vibrios in wet or stained stool preparation or culture of faecal or rectal swabs.

**Differential Diagnosis:**

1. *Food poisoning*—(a) Bacterial—(i) Due to living micro-organisms such as Salmonella, Staph. aureus. Diarrhoea may be accompanied by blood and mucus. Abdominal colic.

creatitis, severe liver failure, cirrhosis of liver and advanced cardiac failure.

2. *Bilateral cortical necrosis*—Pregnancy.
3. *Acute glomerulonephritis.*
4. *Acute interstitial nephropathy*—(a) Micro-organisms coming from the urinary tract (acute pyelonephritis) or via blood stream (septicemia) are present within the kidney itself. (b) Drug hypersensitivity—Penicillin, methicillin, rifampicin, or phenindione therapy.
5. *Acute vascular nephropathies*—(a) Renal artery or venous thrombosis. (b) Renal cortical necrosis—occurs mostly in late pregnancy. (c) Papillary necrosis (necrotising papillitis)—may complicate acute pyelonephritis or ureteric obstruction. (d) Malignant nephrosclerosis—e.g. in accelerated hypertension.

**Post-renal:**

1. *Urethral*—Stricture, prostatic hypertrophy.
2. *Ureteral*—(a) Obstruction—Calculi, fibrosis, tumors, papillary necrosis. (b) Damage—Trauma, pelvic surgery.
3. *Tubular obstruction*—Urate nephropathy, myelomatosis, sulphonamides.

**Pathogenesis of ARF:** Several factors may initiate ARF—

1. *Renal cortical ischemia*—Preferential ischemia of outer cortex has been demonstrated in hypotensive dogs and in patients with ARF of various etiologies. This suppresses the glomerular filtration rate.
2. *Catecholamines and renin-angiotensin system*—Renal cortical ischemia may be promoted by adrenergic stimulation, release of catecholamines and intrarenal activation of renin.
3. *Cell swelling*—Renal cell swelling sometimes perpetuates the microvascular obstruction and prolongs ARF.
4. *Intravascular coagulation*—is an aggravating factor, especially in obstetric patients.

**Clinical features**—Stages :

1. Early or pre-oliguric stage—This is overshadowed by symptoms of the primary cause. Symptoms like lethargy, nausea, headache, are indicative of overhydration and should arouse suspicion of impending renal insufficiency. Normally the ratio of urea in the urine to that in the

copious oral fluid such as 4 gm. sodium chloride, 25 gm. glucose with added syrup for taste per litre of boiled water. If urinary output is satisfactory (at least 60 ml. per hour) 2 gm of potassium chloride are added to each litre of oral fluid. (b) *Severe case*—(i) *Initial hydration*—Ringer lactate solution is effective in both children and adults. A cutdown may be necessary or the needle may be placed in the femoral vein till the first litre of fluid has run in. The amount of fluid required may be 7-8 litres in adult—2-3 litres in first hour followed by one litre/hour until the estimated deficit is made up. (In children 60 ml/kg in 4 hours, half of this in first hour). (ii) *Maintenance hydration*—Once initial hydration is achieved, vomiting will cease. This allows maintenance hydration by mouth with glucose and electrolyte solution.

2. *Drugs*—(a) *Tetracycline*—100 mg. IV 6-hourly for 24 hours, then 500 mg. orally 6-hourly for 3 days causes the stools to become vibrio free within 24 hours. (b) *Furazolidine* (Furoxone)—400 mg. as single oral dose per day for 3 days.

*Immunization*—Vaccine containing a suspension of 8,000 organisms per ml., injection of 0.5 ml. followed after 7-10 days by 1 ml. Relative immunity lasts for 6-12 months. Booster doses of 1 ml. every 6 months may be given in endemic areas.

## 6. PLAGUE

**Epidemiology**—*Causative organism*—Gram negative bacilli Yersinia pestis. *Mode of transmission*—It is normally transferred from rodent to rodent (in whom it is enzootic) by fleas. Man can be infected through the infected flea or occasionally by louse or bedbug, and sometimes from droplet infection from cases of pneumonic plague. Permanent immunity results from an attack.

*Incubation period*—2-4 days.

**Clinical Features:**

1. *Bubonic plague*—commonest variety.
   (a) *Stage of invasion*—Bodyache, mental confusion. Bubo appears on second or third day, usually in groin. Typical plague bubo is very tender and associated with extensive cellulitis of surrounding tissues.
   (b) *Febrile stage*—Onset may be with high fever without prodromata. The temperature continues as a high remittent fever for 2-5 days and then falls suddenly, or

Bleeding tendency and platelet function abnormalities appear in patients with uncontrolled uremia.

3. DIURETIC STAGE—This phase of the disease is ushered in by increase in urinary output to about 1000 ml. in 24 hours; this may progress to polyuria. Febrile reaction is common and uremic symptoms may be aggravated and lead to coma. With profound diuresis dehydration may set in.

**Management:**

**A. Prevention of ARF—**

1. *Hypotension and fluid deficits*—Pre-renal factors (hypotension should be promptly corrected especially in surgical and trauma patients). Blood, plasma expanders or saline are given IV according to the estimated loss.
2. *Diuretics*—(a) *Mannitol*—100-150 ml. of 10% solution or 50 ml. of 20% solution (maximal dose 50 g. in 24 hours), after shock and/or fluid depletion has been treated and urinary obstruction excluded. If urine flow exceeds 50 ml./hour, further doses should be given 3 or 4 hours later to maintain an output of about 100 ml./hour. Mannitol can also be used to determine whether renal failure is due to dehydration. Infusion of 100 ml. 20% mannitol over 15 minutes should result in a diuresis of 100 ml. in the next 2 hours in the presence of dehydration but not if there is renal impairment. (b) *Frusemide*—in large doses is equally effective. Shock, hypotension or fluid depletion must be excluded or corrected first. A first dose of 100-200 mg. IV (or 250-500 mg. by mouth) is followed every 3-4 hours by equal doses if urine flow increases. Urinary losses of water, electrolytes must be replaced by 5% dextrose containing 4-6 g./litre NaCl and 1-1.6 g./litre KCl, adjusted to the actual urinary output
3. *Intravascular coagulation*—Since this is an aggravating factor in ARF IV heparin 2-5 mg./kg./24 hours may be given, however it may aggravate local bleeding.

**B. Specific treatment of the causes of ARF—**

Chelating agents in heavy metal poisoning, alkali therapy in sulphonamide toxicity, early diagnosis and treatment of infection, antihypertensives in malignant nephrosclerosis, prednisolone in hypercalcemia, curettage in septic abortion, etc.

**C Management of established ARF—**

1. *General measures*—(a) Nursing care with prevention of decubitus ulcers and careful mouth toilet. (b) Nystatin

Opened only when they point, allowed to drain, and dressed with sulphonamide powder.

3. *General*—Good nursing. Sedatives for pain and restlessness. Pneumonic plague patients must be strictly isolated to prevent droplet infection.

*Immunization*—Vaccine containing 2,000 million killed organisms per ml. 0.5 followed by 1 ml. after 7-10 days. Immunity lasts for 6-12 months.

*Protection of contacts*—Tetracycline 500 mg 6-hourly for 5 days for close contacts of plague patients or those believed to be incubating the disease.

## 7. TYPHOID FEVER

**Etiology**—*Age*—More common in adolescents and young adults, rare in children and aged. *Transmission*—Salmonella typhosa, the causative organism enters by the alimentary canal through contaminated water, milk or foodstuffs. House flies are important vectors of the infection. *Source of infection*—is the infected excreta of the individual harbouring the organisms either a temporary or chronic carrier after clinical recovery. Prolonged carrier states are usually due to biliary infections, but an infected pelvis of the kidney can also retain the infection for many months.

*Incubation period*—10-15 days.

PATHOGENESIS—After penetrating the intestinal mucosa the organisms multiply silently in the reticuloendothelial tissues until, at the end of the incubation period, invasion of blood stream marks the onset of clinical illness. Secondary invasion of the intestine via the liver and biliary passages leads to the involvment of Payer's patches.

**Clinical Features:**

1. INVASION (1st week)—
   - (a) Onset—insidious. Lassitude, frontal headache, bodyache, anorexia, abdominal discomfort, slight diarrhoea with intermittent constipation.
   - (b) Gastrointestinal system—Tongue coated with raw tips and edges (typhoid V tongue). Abdomen bceomes distended and uncomfortable. Initially there may be either diarrhoea or constipation, but by the end of the week there is usually diarrhoea (pea soup stools).

7. *Antibiotics*—because infection is a major complication. Sulphonamides, nitrofurantoin and tetracycline should not be used.
8. *Other measures*—(i) For nausea and vomiting—Metoclopramide (Maxolon) or triethylperazine (Torecan) 10 mg. IM. (ii) For sedation and fits—Diazepam. (iii) Analgesics —Paracetamol or pethidine. (iv) Anemia—Packed red blood cells. (v) Antacid therapy—for preventing bleeding from stress ulcers especially in post-trauma and surgical patients.
9. *Dialysis*—

   *Indications*—

   (a) *Clinical deterioration*—especially neurological abnormalities such as fits resulting from water overload or bleeding.

   (b) *Biochemical indications*—(i) Blood urea above 200 mg./100 ml. (33 mmol/litre) and/or serum creatinine above 10 mg./100 ml. (900 $\mu$ mol/litre). (ii) Hyperkalemia which does not respond to other forms of treatment. (iii) Severe metabolic acidosis.

COMPARISON OF PERITONEAL DIALYSIS AND HEMODIALYSIS IN ARF:

| | *Peritoneal dialysis* | *Hemodialysis* |
|---|---|---|
| Advantage or disadvantage | Simple to manage, requires minimum equipment and staff | Expensive hemodialyser, experienced staff, sufficient blood required |
| Urea clearance | 10-20 ml/min | 100-150 ml/min |
| Specific indications | Old or very young patients, circulatory failure, coagulation disorders | Hypercatabolic states, contraindications to peritoneal dialysis |
| Contraindications | Recent abdominal surgery, intraperitoneal adhesions, drains or fistulae; respiratory insufficiency, diabetes | If use of heparin is dangerous |
| Complications | Peritonitis, trauma to viscera, excessive dehydration, resp insufficiency, loss of plasma proteins | Hypotension, external hemorrhage, bleeding tendency (heparin), air embolism, bacteremia, disequilibrium syndrome |

as a result of a mild attack or are inadequately treated with short courses of chloramphenicol.

**Complications:**

1. GASTRO-INTESTINAL:
   (a) *Meteorism*—Abdomen distended, tense, tympanitic. May be accompanied by diarrhoea. Favours perforation and hemorrhage.

   (b) *Hemorrhage*—Usually at end of 3rd week. Sudden onset with faintness, pallor and symptoms of shock, rapid fall of temperature to subnormal, thready rapid pulse, fall of B.P. Stools—Streaks of blood or frank bright blood or tarry stools. Passage delayed for hours or 2 days after hemorrhage.

   (c) *Perforation*—Usually at same stage of disease as hemorrhage. Preceding diarrhoea and distension common. May occur in mild attacks. Pain in abdomen and collapse, rapid pulse and local or general peritonitis.

   (d) *Parotitis*—Due to oral sepsis. Suppuration common. Danger of aspiration bronchopneumonia and death from septic absorption.

   (e) *Acute cholecystitis*—with pain, tenderness, and rigidity in the epigastrium and right hypochondrium. May occur at onset but usually doses not develop till the 3rd week or later. An important sequel of typhoid cholecystitis is the formation of gallstones.

   (f) *Non-perforative peritonitis*—In rare cases peritonitis may occur apart from perforation of intestines or other organs such as the gall-bladder, spleen, or suppurating mesenteric glands The symptoms do not differ from those of perforative peritonitis.

   (g) *Acute pancreatitis*—Abrupt onset of agonising pain across the upper abdomen radiating sometimes to back and shoulders. Vomiting and distension of abdomen, collapse and shock, abdominal rigidity, pallor or cyanosis Mistaken for perforation. Increased serum amylase diagnostic.

   (h) *Jaundice*—very rare, due to hepatitis.

   (i) *Hepatic abscess*—rare. Single or more often multiple. Principal symptoms are pain in the region of the liver with slight enlargement, occasional jaundice and increasing leucocytosis.

   (j) *Appendicitis*—may occur at any stage.

   (k) *Splenic abscess or rupture.*

2. RESPIRATORY SYSTEM—Typhoid pneumonia in 2nd to 3rd weeks with consolidation typical of lobar pneumonia.

3. GENITO-URINARY—Retention of urine. Orchitis may occur during convalescence Pyelonephritis.

4. *Renin*—Impaired perfusion of remaining renal tissue may stimulate the inappropriate release of renin.
5. *PTH*—One of the principal disturbances of endocrine function in CRF is marked hyperplasia of parathyroid glands with very high levels of PTH. This contributes to renal osteodystrophy, soft tissue calcification and bone necrosis in CRF, and also probably to pruritus, anemia, hyperlipidemia, neurological disturbances and sexual dysfunction. However patients with primary hyperparathyroidism manifest few of these disturbances and the role of PTH in uremic toxicity is still uncertain.
6. *'Middle molecules'*—The middle molecule hypothesis is based on the apparent absence of neuropathy in patients on chronic peritoneal dialysis (which is less efficient than hemodialysis in removing small molecules, but more efficient for middle molecules), and the high risk of neuropathy in patients treated with small surface area dialyzers. Also the observation that when weekly hemodialysis time was markedly reduced, neuropathy did not appear provided a membrane highly permeable to middle molecules was used. While the identity of uremic toxins is largely unknown, it is suggested that some dialysis schedules permit the accumulation in body fluids of molecules in the range 1,000 to 2,000 daltons, and that these cause some of the uremic problems encountered by patients receiving regular dialysis.

**Stages:** of chronic renal failure—

1. *Diminished renal reserve*—About 50-70% of kidney function has to be lost before the effect on blood chemistry becomes readily detectable, e.g., by rise of blood urea.
2. *Renal insufficiency*—from loss of further kidney function There is moderate nitrogen retention (blood urea 50-100 mg./100 ml , plasma creatinine 1.5-2.5 mg./100 ml.) and mild acidosis may occur. Usually no symptoms except nocturia. Hypertension may dominate the clinical picture
3. *Stage of renal failure*—Further kidney damage produces considerable nitrogen retention, derangement of plasma electrolytes, anemia and usually marked symptoms The term 'uremia' is reserved for the clinical syndrome resulting from advanced renal failure, when glomerular filtration rate is usually less than 5 ml/minute. The neuromuscular and circulatory complications of renal failure then predominate.

**Differential Diagnosis:**

1. *Paratyphoid fever*—(a) Mode of onset often acute and atypical. (b) Wider remissions of temperature. (c) Eruption more profuse. (d) Less toxemia. (e) Sweating and rigors more common. (f) Intestinal complications rare.
2. *Short fever*—A fever lasting for 8 to 10 days; no associated signs, probably of viral origin. Subsides spontaneously. No complications.
3. *Amoebic hepatitis or abscess*—Pain in right hypochondrium and lower chest, moderate fever, enlarged tender liver or compression tenderness over right lower intercostal spaces. Right hemidiaphragm may be elevated and immobile on fluoroscopy.
4. *Infective hepatitis*—in pre-icteric stage. Marked nausea and vomiting, hepatic tenderness, high coloured urine.
5. *Tuberculous meningitis*—Absence of abdominal discomfort, greater frequency of vomiting, persistence of headache after first week, irritability, irregular pupils, C.S.F. changes.
6. *Miliary tuberculosis*—Increased respirations. Irregular temperature, tachycardia, cough and cyanosis, symptoms referable to alimentary tract less pronounced. Early loss of flesh.
7. *Heat fever*—Not uncommon in children and aged. Fever may be continuous or touch normal for some hours every day. Absence of other physical signs. Response to lowered temperature.
8. *Subacute infective endocarditis*—(a) Fever seldom continuous or high. (b) Frequent chills with septic type of temperature. (c) Cardiac signs. (d) Anemia. (e) Embolic phenomenon. (f) Positive blood culture.
9. *B. coli infection*—Pyelitis or septicemia—High fever, though not of continuous type. May last for 2-3 weeks. Leucocytosis, tenderness in loins, pus in urine or positive blood culture.
10. *Malaria*—Sudden onset, wide diurnal variation, early splenic enlargement, malarial parasites in blood, response to antimalarial drugs.
11. *Kala-azar*—May have typhoid type of onset. Progressive splenic enlargement Characteristic double rise of temperature. Good appetite. No toxemia.
12. *T.B. peritonitis*—Slow onset, continuous fever and meteorism as in typhoid. Caseous masses palpable, negative Widal test.

Hypercatabolic renal failure refers to rise of urea of more than 6.5 mmol/litre per day.

2. *Bicarbonate*—Low levels depending on degree of acidosis
3. *Plasma sodium*—Hyponatremia is common.
4. *Potassium*—Normal values until terminal stages when hyperkalemia occurs.
5. *Calcium, phosphate and magnesium*—Increased plasma phosphate and decreased calcium levels. Magnesium levels normal or slightly raised.
6. *Uric acid*—increased.
7. *Hyperlipidemia*—Raised plasma levels of triglycerides and pre-beta lipoproteins.
8. *Anemia*—Normochromic normocytic anemia almost constant.

DIFFERENTIATION OF CRF FROM ARF—Features which suggest CRF rather than ARF are—

1. *History*—of long-standing urinary symptoms such as nocturia, chronic ill-health.
2. *Examination*—Retarded growth or sexual development, pigmentation, opaque white nails, pericardial rub (less common in acute renal failure), palpably enlarged kidneys suggesting polycystic disease or chronic obstructive uropathy, patient less ill than blood urea level might suggest.
3. *Investigations*—Normochromic normocytic anemia invariable, uremic osteodystrophy, e.g., sub-periosteal erosions in phalanges, raised serum alkaline phosphatase, radiology shows shrunken kidneys.

**Management:**

1. DIET—(a) *Low-protein diet*—Calories—50-55 kcal/kg body weight/day. Protein—0.3 g/kg body weight/day of high biological value (HBV) protein. The Giordano-Giovannetti low-protein diet consists of 2,000 calories, 500 ml water, 12 mmol of sodium and 16 mmol of potassium. (b) *Electrolyte requirements*—Moderate potassium restriction. Sodium intake modified according to circumstances, e.g., hypertension or salt wasting tendency. (c) *Amino-acids* —1 Rose unit (Rose unit = absolute minimal amount of an essential amino acid/kg body weight/day) and rest of the nitrogen as HBV protein, or low protein diet of 16-20 g/day, with supplement of 1.5-3.0 Rose units of essential

*Furazolidone* (Furoxone)—Effective and less toxic. Dose for adults 200 mg. t.d.s. till temperature touches normal, then 100 mg. t.d.s. for 7 days.

**II. General—**

1. *Nursing*—(i) Mouth cleaned after each feed with hydrogen peroxide solution or glycerine borax. (ii) Care of skin—Application of methylated spirit and dusting afterwards with powder.
2. *Diet*—(a) *During fever*—(i) *Milk diet*—3 pints of milk daily. Give 5 ounces diluted with half volume of water every 2 hours. To each feed add teaspoonful of lactose or glucose. One of the flavoured proprietary preparations of protein may be given in water for additional nourishment. Also sweet lime juice, orange juice, barley water with lemonade, or coconut water 6-8 oz. at a time. If milk clots appear in stool, reduce quantity of milk or dilute further. If still persistent, use whey or skimmed milk. (ii) *More liberal diet*—To provide about 3,000 calories per day. Advantages are—increases patient's resistance, hemorrhage and perforation less likely, prevents rapid emaciation. Articles of diet given—milk, lactose, toast, butter, mashed potatoes, lightly boiled egg, cornflour or wellboiled rice pudding, and custard, bananas and apples. Feeds 2 hourly. (b) *During convalescence*—If previously on milk diet, start diet gradually. Bread and butter, mashed potato, curds, boiled fish or minced meat, jelly, etc., added slowly.

**III. Symptomatic management and management of complications—**

(a) *Abdominal distension*—(i) Omit sugar. (ii) Reduce amount of milk. (iii) Turpentine stupes. Flannel or piece of lint wrung out in hot water containing 20 minims of oil of turpentine in 2 pints of water. (iv) Flatus tube.

(b) *Diarrhoea*—may be due to disease itself or sometimes the drug. (i) Reduce quantity of milk or dilute it further. Give butter-milk and sago cangee or rice cangee in water, apple juice or pomegranate juice (ii) Omit sugar. (iii) If intractable stop milk and give albumen water or whey for few days. (iv) Starch opium enema —1 teaspoonful of starch in 2 oz. of water plus 30 m Tr. opii. (v) Kaolin and bismuth by mouth, or diphenoxylate (Lomotil) 2.5 mg. tablets 2 t.d.s.

(c) *Hyperpyrexia*—(i) Tepid sponge (ii) Ice bag to head. (iii) Sponging with ice-water. (iv) Ice water enema.

6. DIALYSIS—Indications—
   (a) Control of fluid overload, especially pulmonary oedema.
   (b) Persistent hyperkalemia.
   (c) Pericarditis.
   (d) Neurological complications like clouding of consciousness or drowsiness, fits, uremic flap or peripheral neuropathy.
   (e) Chronic malaise and inability to work even without above complications (serum creatinine usually above 1000-1200 $\mu$ mol/litre). Peritoneal dialysis may be used to control renal uremia while long-term plans are made or investigations completed. Intermittent peritoneal dialysis can be continued for a long time but it is advisable to admit the patient (if suitable) to a hemodialysis/transplantation unit.
7. RENAL TRANSPLANTATION—is the major alternative to chronic dialysis. The grafted kidney may be from a living related donor, or from a cadaver. When practicable, the ideal plan is to train the patient for home dialysis, and then, if patient desires, transplantation can be attempted with the advantage that if it fails, the patient can return to home dialysis

**Continuous ambulatory peritoneal dialysis (CAPD)—**

*Advantages*—Feeling of well being and greater degree of freedom for the patient, more liberal diet and fluid intake, better blood pressure control, better biochemical control (steady state), suitable for all age groups and diabetic patients, lower cost, improvement of anemia. *Disadvantages*—Peritonitis, mechanical problems, obesity and hyperlipidemia.

*Complications*—(1) Due to technical problems—renal artery stenosis leading to hypertension or graft infarction. Ureteric fibrosis causing hydronephrosis (2) Due to immunosuppressive therapy—Infections bacterial, viral or fungal (3) Due to steroids—Cushing's syndrome, hypertension. (4) Avascular necrosis and collapse of articular cartilage of weight bearing joints.

## 6. HYPERTENSIVE ENCEPHALOPATHY

**Definition:** An acute and transitory disturbance of cerebral function occurring in association with a rapid rise of diastolic blood pressure in a patient with severe hypertension, regardless of the cause The essential pathological features are constriction of central arterioles and cerebral oedema

*Early symptoms*—Malaise, muscular pains, pain in jaw and gastric disturbances.

TYPES :

1. *Acute*—Period of ill-health for about 2 weeks with fever, headache, sweating, fatigue and joint pains precede acute onset. Profuse sweats and sacroiliac arthralgia characteristic symptoms. Lymphadenopathy, splenomegaly and hepatomegaly may occur. Acute disease lasts for 2-4 weeks. White cell count—Leucopenia with lymphocytosis.
2. *Subacute*—Illness fails to resolve after 4 weeks, or exacerbations occur after this time. Muscle weakness and extreme fatigue may be mistaken for neurosis. Painful joints. Periods of good health interrupted by occurrence of symptoms.
3. *Chronic*—Recurring exacerbations persisting for many years. Clinical picture resembles repeated attacks of influenza. Headache, lassitude, fatigue and backache. Fever uncommon. Anxiety and depression. Localisation of brucella in liver, spleen, bone marrow lead to formation of granulomata.
4. *Subclinical or latent*—Presence of antibodies in serum of healthy veterinary surgeons and students.

COMPLICATIONS—Thrombophlebitis, meningitis, meningo-encephalitis, endocarditis. Spondylitis and crippling arthritis.

DIAGNOSIS—(i) *Blood culture*—It is difficult to isolate the organism. Bone marrow culture may be positive in chronic cases. (ii) *Serological tests*—Standard agglutination (SAG) demonstrates high titres of antibody (macroglobulin) and is diagnostic of acute brucellosis.

**Treatment:** Oral tetracycline 2-3 g/day in 4 divided doses. In case of failure of response or relapse combination with IM streptomycin. Chemotherapy is given to suppress exacerbations in acute and subacute infection. In chronic infection treatment is symptomatic.

*Prevention*—1. Pasteurization of raw milk. 2. Vaccination of female calves. 3 Slaughter of infected cattle.

## 9. LEPROSY

**Etiology:** *Organism*—Mycobacterium leprae. A slowly multiplying organism which has been grown in the footpads of mice and in the armadillo. *Mode of infection*—With the rare exception of leprosy caused by direct implantation of organisms into

Phentolamine 5 mg. IV or Phenoxybenzamine (1 mg./kg.). In pregnancy toxemia sedatives such as chlorpromazine and morphine should be given before using antihypertensive drugs.

3. *Magnesium sulphate*—4 oz of 25% solution by rectal drip, or 2 to 4 ml. (0 2 ml. per kilogram bodyweight) of 50% solution I.M, or in severe cases 100-200 ml of 1% solution by I.V. drip, or 10-20 ml. of 10% solution I V. slowly. Lowering of blood pressure occurs in 1-2 hours The drug may have to be repeated at 4 hourly intervals If respiratory dyspnoea is produced, inject 10 ml. 10% calcium gluconate I.M.
4. *Hypertonic sucrose or glucose*—200 ml. of 50% solution I.V. to lower intracranial tension Sucrose preferred because glucose often induces a secondary rise in C.S.F. pressure.
5. *Mannitol*—Initial rapid infusion of 50 ml 25% mannitol, continued as slow infusion of 400 ml.
6. *Venesection*—500 ml. of blood should be removed.

## 7. URINARY TRACT INFECTION (UTI)

**Etiology**—(1) *Age and sex*—Higher incidence of acute pyelonephritis during first 18 months of life due to faecal soiling of urethral meatus. Ten times more common in females during child bearing age due to sexual trauma and pregnancy. (2) *Predisposing factors*—(a) *Obstruction*—Strictures, calculi, aberrant vessels, periurethral fibrosis, foreign bodies, phimosis, neurogenic bladder. Renal diseases such as hypoplasia, cystic disease, nephritis. (b) *Trauma*—Injury, catheter, instrumentation, surgery. (c) *Ischemia*—either caused by local events or in association with hypertension or ageing. (d) *Metabolic disorders*—Diabetes mellitus, gout, nephrocalcinosis, hypokalemia, agammaglobulinemia, vitamin A deficiency. (e) *Miscellaneous*—Pregnancy, vesico-ureteric reflux, sickle cell trait, analgesic abuse, x-irradiation. (3) *Common organisms*—Most urinary tract infections are caused by Gram-negative aerobic bacilli found in the gut The most common organism is E. coli followed by Klebsiella, Proteus and Enterobacter. Also pseudomonas, staphylococcus and streptococcus Organisms such as Serratia marcescens and Candida albicans may produce infection in patients subjected to instrumentation, particularly those with indwelling urinary catheters. (4) *Routes of infection*—The infecting organism may be conveyed to the kidneys by—(a) blood stream, (b) ascending infection from bladder up the lumen of ureters, (c) lymphatics alongside the ureters.

### Acute pyelonephritis

SYMPTOMS AND SIGNS :

(a) *In adults*—(i) *General*—Sudden onset of fever with rigors Malaise and pallor. Frequently nausea and vomiting Blood pressure normal. (ii) *Local*—Pain and tenderness

cranial nerves trigeminal and facial. In majority of cases there is further spread of disease from nerves to skin.

(b) *Skin lesions*—Early manifestations consist of the development of macules, usually few and asymmetrically distributed over the body, particularly over the lateral aspect of the arms, legs, buttocks and shoulders. They have well defined edges, are hypopigmented and usually there is loss of sensation especially to light touch over them. Tuberculoid macules usually enlarge centrifugally and their central region becomes depigmented as they do so. Their edge is erythematous and it may become distinctly raised and sensory changes will invariably be present over them. The skin of most of the lesions is dry and scaly. Anhidrosis is characteristic of skin lesions of tuberculoid leprosy.

**2. Lepromatous leprosy—**

Usually commences with the appearance of macules on the skin, they are usually distributed symmetrically over the body, and the trunk and thighs are very often affected. They are small, have an ill-defined edge, do not contrast strikingly with the surrounding skin and are not dry. Early symptoms may be referred to nose, eyes or legs. Nasal symptoms consist of blockage, discharge and bleeding, ocular symptoms are of hazy vision or attacks of pain and redness, and the legs become oedematous. Skin macules are numerous and sooner or later papules and nodules appear as well as fresh macules. All these lesions are shiny with impairment of sensation or hair growth, multiple and distributed bilaterally. Nerves are not thickened at this stage. Eyes may show superficial punctate keratitis. General health is undisturbed. If patient remains untreated, the lines of the forehead become deeper as the skin becomes thickened (leonine facies), the eyebrows become thinned or lost, the nose becomes broadened and deformed, the ear lobes are thickened, the voice becomes hoarse, the upper central incisor teeth loosen or fall out, and a slow fibrosis takes place in the peripheral nerves resulting in nerve thickening and 'glove and stocking' anaesthesia which in turn leads to shortening of fingers and toes due to oft-repeated trauma. Testicular atrophy in males causes sterility, impotence and gynecomastia.

**3. Borderline leprosy—**

Occurs in those with an intermediate degree of resistance.

(a) *Borderline lepromatous*—Nerve involvement is often mani-

*white cells*—Pyuria frequent but not constant. Prednisolone stimulation test—After IV injection of 40 mg prednisolone phosphate there should be white cell excretion of more than 400,000 per hour. (iii) *Urine culture*—Positive in one quarter to half of patients. Pyuria in apparently sterile urine occurs in tuberculosis of urinary tract and may be found in analgesic nephropathy. (iv) *IVU*—may show irregularity of both kidneys, or one kidney may be smaller than the other. The cortex is singularly thinned and the underlying pelvicalyceal pattern distorted. (v) *Serum antibody titre*—against the infecting organism is raised if there is tissue infection.

*Course*—Acute exacerbations may occur at irregular intervals during which the symptoms are more pronounced. The disease may persist for years ultimately terminating in death from uremia or infection.

**Management:**

**Acute pyelonephritis—**

1. *High fluid intake*—Patients should be advised to increase their fluid intake (at least 2 litres) and to practise frequent micturition in order to keep the bladder empty.
2. *Antibacterial agents*—(a) *Selection of drug*—It is justifiable to start treatment with sulphonamides pending the results of culture and in vitro sensitivity. (b) *Duration of treatment*—Should be for one week in the first instance. Evidence of cure requires that a microscopically or culturally normal urine be obtained on three consecutive weekly examinations after medication has been discontinued. (c) *Adjustment of urinary pH*—(i) Acidification of urine for mendalamine and tetracycline (ii) Alkalisation enhances effect of sulphonamides and gentamicin It may relieve symptoms in E coli infections in which urine is acidic.

*Drugs for urinary tract infection:*

| *Drug* | *Dose* | *Remarks* |
|---|---|---|
| *Chemotherapeutic agents·* *Sulphonamides—* Sulphafuxazole (Gantrisin) Sulphadimidine | 1 g. 6 hourly | Effective principally against gram-negative organisms particularly coliform infections Fluid intake of atleast 2 litres a day necessary. |

**Management :**

A. CHEMOTHERAPY—

1. *Multibacillary disease*—must be treated with three drugs in order to prevent dapsone resistance. Dosage for adult (50 kg. or more):
   Rifampicin 600 mg daily for 4 weeks. Dapsone 50-100 mg daily for life. Clofazimine (Lamprene) 100 mg three times a week for one year.
2. *Paucibacillary disease*—Dapsone 25-50 mg daily for 3-10 years depending on classification of the disease and rate of progress.

B. MANAGEMENT OF LEPRA REACTION—(a) Rest and sedatives. (b) Anti-leprosy drug should be stopped. (c) Intercurrent infection must be excluded. (d) Drugs—(i) Type 1 reactions —Prednisone 40-80 mg daily reducing over several weeks. (ii) Type 2 reactions—Thalidomide 100-400 mg daily (contraindicated in premenopausal women), or Clofazimine 100 mg daily or Prednisone 10-20 mg daily.

C. SURGICAL TREATMENT—Excision of small lesions. Large nodules touched with strong carbolic or nitric acid. Removal of necrosed bones and splitting of nerve sheath if a nerve is constricted by dense fibrous tissue. For persistent localized severe nerve trunk pain, infiltration of the thickened nerve sheath or the nerve itself with 10 ml. 1% procaine, or with the latter solution to which 25 mg of hydrocortisone and 1,500 units hyaluronidase have been added. The injection may be repeated. Reconstructive surgery is required for paralysed fingers, foot-drop, and hammer toe, and plastic surgery can correct facial disfigurement caused by loss of eyebrows, facial palsy, saddle-nose deformity, ectropion, pendulous ear lobes.

PREVENTION—Child contacts may be given BCG vaccination, especially infants born in leprous families. Children who have been in close contact with lepromatous leprosy can be given prophylactic dapsone for a minimum of three years. Now that quantities of M. leprae are available from experimentally infected armadillos, a specific vaccine becomes a possibility.

## 10. RICKETTSIAL INFECTIONS

**Definition**—Rickettsial infections are caused in man by rickettsial organisms which are small bacteria varying in size from cocoidal to bacillary. They are obligate intracellular para-

| Drug | Dose | Remarks |
|---|---|---|
| *Aminoglycosides* Kanamycin sulphate | 0 5 g IM b d | Effective against E. coli, Aerobacter Staph. aureus and Proteus Toxic effects include renal irritation, dysfunction in elderly patients and skin eruptions. |
| Gentamicin | 3 mg /kg./day in 3 divided doses IM | Broad spectrum. Drug of choice in serious infections. Ototoxic (not reversible) Nephrotoxic (reversible). |
| Colistin (Colomycin) | 150 mg b d IM | Useful in severe or recurrent infections caused by gram-negative organisms. Side effects include nausea, dermatitis and fever. |

**Chronic pyelonephritis:**

1. *Antimicrobials*—Resistant organisms are more likely to be encountered in patients with recurrent infections who have previously received courses of antibiotics. Treatment should therefore be guided by bacteriological monitoring. Standby courses of co-trimoxazole or ampicillin type of antibiotic may be given to the patient so that she can start treatment at the onset of symptoms. For problem cases prolonged courses of suppressant antimicrobials have proved useful—low dose of nitrofurantoin (50 mg. nightly), co-trimoxazole (1 tablet nightly) and cephalexin (125 mg. nightly). They are given at night because bladder emptying occurs less frequently during night hours. Nitrofurantoin has been recommended because it is less likely to give rise to the emergence of resistant organisms within the bowel. This advantage is shared by hexamine hippurate (Hiprex) and hexamine mendalate (Mandelamine).
2. *Symptomatic treatment*—includes use of hypotensive drugs and treatment of chronic renal failure.
3. *Surgical treatment*—Surgical correction of lesion which may predispose to the persistence or recurrence of infection. Pyelonephritis associated with vesico-ureteric reflux is not necessarily an indication for reimplantation of ureters, because the reflux often clears up spontaneously.
4. *Unilateral pyelonephritis*—Results from nephrectomy occasionally spectacular but more often disappointing. Hypotensive therapy should be tried first.

**II. Spotted fever infections:**

1. Rocky Mountain spotted fever—is the most severe form. Caused by R. ricketsii and carried by ticks. Abrupt onset of fever with chills severe headache, photophobia, prostration and muscle and joint pains. Temperature 40°-41°C with irregular morning remissions. Rash appears on 3rd or 4th day, maculopapular, first on extremities then spreading to the trunk; the rash becoming petechial. In severe cases rash becomes confluent, deep red or purple and may necrose. CNS manifestations include restlessness, confusion and delirium. In severe cases coma and peripheral vascular collapse precede death.
2. Fievre boutonneuse, Siberian tick typhus and Queensland tick typhus—are three other tick-borne rickettsial diseases and are milder than Rocky Mountain spotted fever. Characteristic feature is a primary cutaneous lesion or eschar at the site of tick bite. Regional lymphadenopathy in glands draining the eschar. Maculopapular rash. Fever subsides by lysis in 2nd week.
3. Rickettsial pox—caused by R. akari, transmitted to man by blood-sucking mite. Fever, eschar and papulovesicular eruption. Recovery in 1-2 weeks without sequelae.

**III. Scrubtyphus infections**—caused by R. tsutugamushi and transmitted by larval mites. Eschar at site of mite feeding. Lymph nodes draining the eschar swollen and tender with generalised lymphadenopathy, fever, chills, headache, malaise and orbital pain. Maculopapular rash in about 50% may appear between 3rd and 7th day. Lymphocytosis in blood (large lymphocytes). Convalascence prolonged.

**Laboratory diagnosis:**

1. *Indirect fluorescence antibody (IFA) test*—In Rocky Mountain spotted fever IgM antibodies appear within 3-8 days, while IgG antibodies are detected within 3 weeks.
2. *Complement fixation* (FT) test—less sensitive than IFA test.
3. *Weil Felix reaction*—Agglutinins are detected in second week and peak in fourth week. Louse, flea and tick-borne typhus agglutinate with strain OX-19 and OX-2, scrub typhus with OX-K alone.
4. *Enzyme-linked immunosorbent assay* (ELISA) and fluorescent antibody staining of frozen tissue sections from rickettsial skin lesions.

4. Plain X-ray—Bilateral enlarged kidneys of irregular contour.
5. Excretion urography—Elongation, tortuosity and spreading of the calyces accompanied by denting of the dye shadow by cysts.
6. *Aortography*—if diagnosis is in doubt. Blood vessels will be deformed and cortex of the kidney will present a worm-eaten appearance.

MANAGEMENT—(1) *Nephrectomy*—indicated if (a) severe uncontrolled hemorrhage, after the correct side is determined by cystoscopy; (b) severe infection with abscess formation. (2) *Medical treatment*—Treatment of infection with antibiotics and treatment of uremia and acidosis. Patients should be advised a high fluid intake.

## 9. HEMATURIA

**Causes:**

**I Causes in the urinary tract—**

*Kidney*—(1) Congenital anomalies—polycystic disease, angioma. (2) Calculus. (3) Mobile kidney. (4) Infections—Pyelitis, pyelonephritis, tuberculosis, glomerulonephritis. (5) Neoplasms—renal carcinoma, Wilm's tumor. (6) Drugs—Sulphonamides, anticoagulants. (7) Trauma—Ruptured kidney. (8) Oxaluria (9) Post-operative—After nephro or pyelolithotomy or partial nephrectomy. (10) Radiation damage. (11) Renal embolization/infarction. (12) Analgesic nephropathy. (13) Unknown origin—Essential hematuria ("renal epistaxis"). Loin pain/hematuria syndrome.

*Ureter*—(1) Trauma. (2) Calculi. (3) Infection. (4) Tumors—papilloma, carcinoma.

*Prostate*—Benign hypertrophy, carcinoma.

*Bladder*—(1) Diverticulum. (2) Trauma—following prostatectomy or other operations or instrumental. (3) Calculus or foreign body. (4) Tuberculosis. (5) Tumors—Simple, papilloma, carcinoma. (6) Ulcers. (7) Chemical cystitis—e.g., after cyclophosphamide. (8) Parasitic—schistosomiasis, Bancroftian filariasis.

*Urethra*—(1) Malformations. (2) Injuries. (3) Calculus or foreign body. (4) Infections. (5) Tumors. (6) Naevus.

**II General causes—**

1. Acute fevers—Malignant malaria.
2. Hypertension.

spasm, associated with terror in response to attempts to drink water. Various other stimuli can excite the reaction, including a draught of cold air (aerophobia), and the sight, sound or mere mention of water. Hydrophobic spasms may end in opisthotonos and generalised convulsions with death from respiratory or cardiac arrest. (b) *Periods of excitement* are common during which the patient becomes wild and hallucinated alternating with lucid intervals. (c) *Other features*—include meningism, cranial nerve lesions, spasticity, involuntary movements, fluctuating body temperature and signs of autonomic overactivity such as salivation, sweating and tachycardia. Death may occur during hydrophobic spasm or patient may lapse into coma and generalised flaccid paralysis.

PARALYTIC RABIES—is rare and seen especially in those bitten by vampire bats. Flaccid paralysis often begins in the bitten limb and ascends symmetrically or asymmetrically until it involves muscles of deglutition and respiration killing the patient in 2 or 3 days. Hydrophobia is unusual but a few spasms may occur late in the illness.

**Laboratory Diagnosis:**

*In the animal*—responsible for the bite, rabies can be confirmed within a few hours by immunofluorescence of brain impression smears or histological examination for Negri bodies, and in about one week by intracerebral inoculation of mice.

*In patients*—Rabies can be confirmed early in the illness by immunofluorescence of skin biopsy, corneal impression smear or brain biopsy and by virus isolation from saliva and other secretions. Fluorescent antibodies are not detectable in serum or CSF before the eight day.

**Management:** Once symptoms have appeared death is invariable. Post-exposure management consists of:

1. TREATMENT OF WOUND—(a) Scrub with soap (or detergent) and water under a running tap for atleast 5 minutes. (b) Remove foreign material. (c) Rinse with plain water. (d) Irrigate with virucidal agent e.g 40-70% alcohol, tincture of iodine or 0.01% aqueous iodine. (e) Explore, debride and irrigate deep wounds (if necessary, use local or general anaesthesia). Avoid suturing and occlusive dressings.

2. **Preventive Inoculation:—**

(a) ANTIRABIES VACCINE—

*Indications*—(i) Bitten by rabid animal. (ii) The animal dies during observation and Negri bodies are found.

hematuria rare. Hematuria precedes pain in tuberculosis and new growth of kidney; follows pain in renal stone.

10. *Absence of pain*—Enlarged congested prostate, early stage of malignant disease of bladder, renal neoplasms, congenital cystic kidneys, tuberculosis and systemic causes. Painless, periodic, progressive and profuse hematuria in simple papilloma.
11. *Increased frequency of micturition*—Local causes in bladder, tuberculosis or pyelitis.
12. *Constitutional symptoms*—Fever in pyelitis and cystitis. Rash or eruption in acute fevers.
13. *Hemorrhages elsewhere in the body*—in purpura, hemophilia, fevers, hypertension.

**Physical examination—**

(a) *Local examination*—

1. Palpation of kidneys—(i) Unilateral tumor—in tuberculosis, hypernephroma, hydro- or pyo-nephrosis. (ii) Bilateral in polycystic disease.
2. Bladder tumor is occasionally palpable.
3. Inspection of external genitals and urinary meatus for local causes.
4. Examination of testis and epididymis for evidence of tuberculosis.
5. Rectal examination—Enlarged prostate, stone in bladder in children.
6. Vaginal examination—pelvic tumor, e.g., malignancy of uterus.

(b) *General examination*—Examination of heart for SBE. Blood pressure. Signs of anaemia. Bruising or other evidence of hemostatic defect. Abdominal palpation for splenomegaly, enlarged kidneys or distended bladder.

**Investigations—**

1. *Urine*—(i) Excess of crystals of uric acid, oxalates, etc., may indicate presence of stones. (ii) Albuminuria and epithelial cells in acute nephritis. (iii) Pus cells in pyelitis and tuberculosis. (iv) Red cell casts establish a renal cause. (v) Culture—Pyuria with no growth on urine culture occurs with tuberculosis, tumors of urinary tract and analgesic nephropathy. (vi) Cytology—when urothelial neoplasm is suspected.

of HDCSV, four weeks apart followed by yearly boosters.

## 12. DENGUE FEVER

**Etiology**—Causative *agent*—Group B arbo-virus of which there are at least four antigenically overlapping strains. *Transmission*—The female of Aedes aegypti moquitoe transmits the disease, man being the normal reservoir of infection. Transmission may be kept up by reinfection of the local inhabitants who have lost the immunity acquired as result of previous attack, or by infection of visiting non-immunes.

*Incubation period*—5 to 8 days.

**Clinical features:**

1. STAGE OF INVASION—Sudden onset with malaise, severe headache, pain in eyeballs, intense pains in joints and muscles, and bodyache aggravated by movements (break-bone fever). Fever, maximum on first day. Flushed face, congestion of eyes and of mucous membranes, photophobia and sometimes nausea and vomiting. Primary *rash* consisting of transitory erythema on neck, face, and shoulders may occur at onset.
2. STAGE OF REMISSION—On about the 3rd day, temperature drops to normal and remains so for 12 hours to 3 days. Patient feels well.
3. STAGE OF TERMINAL FEVER AND ERUPTION—
   - (i) *Recurrence of fever and pain*—on about 6th day from onset but milder than initial stage. Typical "hump-back" appearance of temperature chart.
   - (ii) *Rash*—secondary eruption on 4th to 6th day, macular or scarlatiniform, starting on hands and legs and then generalised except face. May coalesce. Fades in 3-4 days. Desquamation for 2-3 weeks. Enanthem—Small vesicles on soft palate in about 50%.
   - (iii) *Bradycardia*—Pulse is usually rapid during the first few days of fever, but may fall before the drop of temperature, and after the attack is very slow.
   - (iv) *Lymphadenopathy*—Nontender, posterior cervical, epitrochlear and inguinal lymphadenopathy.
   - (v) *Cutaneous hemorrhagic manifestations*—in hemorrhagic dengue vary from petechiae to gross ecchymoses, particularly common in children.

failure e.g. severe hemorrhage, shock or dehydration. (ii) Destruction of large number of glomeruli e.g. chronic nephritis. (iii) Decreased permeability of glomerular capillary walls as in acute nephritis. (iv) Back pressure from obstruction to lower urinary tract.

**Tests and interpretation of results:**

1 URINALYSIS—including microscopy (See p. 618).

2. PLASMA UREA—If fluid is taken in a fairly constant pattern and if urea production is constant, plasma urea rises and falls with GFR.

   *Interpretation*—Normal blood urea—20-40 mg/100 ml., may be higher with high protein diet. Values within the normal range do not exclude renal disease for the blood urea does not become raised until the glomerular filtration rate is approximately halved. This test is valuable in cases with anuria or urinary obstruction, where it is impossible to obtain urinary samples. Serial estimations can provide useful indications of progress in all forms of glomerular failure. If the average 24-hour urine output is only about 500 ml., and the blood urea is normal, then renal function cannot be impaired.

   *Disadvantage*—Urea production varies with protein intake or increased catabolism of body protein e.g. following surgery, trauma or infection, or under influence of corticosteroids or tetracycline. Urea clearance falls out of proportion to GFR during sodium depletion. Conversly plasma urea is lower during anabolism of pregnancy and in liver disease.

3. PLASMA CREATININE—is a better guide to GFR. Its production rate is largely independent of diet. Normal 0 6-1.0 mg/100 ml (60-100 μ mol/litre) Serial measurement of plasma creatinine is the most common means of following progress of chronic renal disease. It is less satisfactory in confirming normal renal function because of the wide normal range. The rise in plasma creatinine with falling GFR is hyperbolic. Considerable renal function is lost in early stage of the disease without significant rise in plasma creatinine whereas a rapid rise occurs during later stage of the disease.

   *Interpretation*—Normal serum creatinine—0.6-1 0mg /100 ml., slightly more in males. Since creatinine is not altered appreciably by exogenous factors it is a better measurement of renal function than urea. However its

*Differential characters of S. minus and S. moniliformis infection:*

| | *Spirillum minus infection* | *Streptobacillus moniliformis infection* |
|---|---|---|
| Incubation period . | 5-30 days | 2-10 days |
| Wound from bite . | Recurrence of local lesion with each onset of fever | Local lesion at onset of disease, heals promptly |
| Lymph nodes .. | May be involved | Regional lymphangitis and lymphadenitis |
| Systemic manifestations | Regularly relapsing type of fever | Intermittent but not regularly relapsing fever |
| | General maculo-papular rash in some cases | Erythematous maculo-papular rash in most cases |
| | Myalgia, no arthritis | Arthritis usually present |
| Laboratory tests . | Isolation of spirillum by animal inoculation | Isolation by blood culture |
| | Agglutination test negative | Agglutination with S. moniliformis positive. |

**Diagnosis:** *S. minus*—Leucocyte count normal or elevated. Organism may be visible on examination of blood or injection into peritoneum of mice or guinea pig; organisms will be visible 5-15 days later in blood or peritoneal fluid of the animal *S. moniliformis*—Neutrophil leucocytosis. Organism may be isolated from blood or joint fluid. Agglutination tests positive in 2nd week.

**Treatment**—Procaine penicillin G 300,000 units IM b.d. or Tetracycline drugs 0.5 gm. every 6 hours for 7 days.

## 14. LEPTOSPIROSIS

**Etiology and epidemiology**—Leptospirosis is an acute infection caused by a genus of small spirochaetes known as leptospira. The serotypes are now classified as serovarieties of a single species L. interrogans. Common are icterohemorrhagica, and canicola. *Source of infection*—Human infection results from direct contact with the urine or tissues of an infected animal (such as mice, voles, shrews, hedgehogs, cattle, pigs and dogs),

mined urea and creatinine clearance is a more accurate measure of GFR.

Formula for calculating GFR (creatinine clearance) from plasma creatinine is as follows:

$$\text{GFR ml/minute} = \frac{1.23^{*} \times (140\text{-Age in years}) \times (\text{Wt. in kg.})}{\text{Plasma creatinine in } \mu \text{ mol/litre}}$$

* (1.04 for females)

(c) *Cr-EDTA clearance*—is used to confirm a normal or nearly normal GFR and to follow changes in GFR in early renal disease, mainly in research.

**Tests of tubular function**—Aminoaciduria, glycosuria, increased phosphate clearance are common manifestations of tubular damage. The tubular factors commonly tested are urinary concentration and acidification.

1. URINARY CONCENTRATION—

(a) *Specific gravity of urine*—The simplest means of measuring urinary concentration is to measure its specific gravity. If an early morning specimen of urine which is free of sugar or protein has a specific gravity of 1020 or more (with normal blood urea) renal tubular damage is unlikely.

(b) *Osmolality of urine*—Many normal individuals achieve maximum urinary concentration at some time in 24 hours. To test concentrating ability the osmolality of all urine samples for 24 hours should be checked. (Water deprivation tests have now largely been given up). If no spontaneous urine sample shows osmolality of 800 mosmol/litre, desmopressin 4 mcg is given IM (or 20 mcg intranasally in each nostril) after overnight fast. Osmolality is measured on all urine samples passed in the next 9 hours. Maximum urinary concentration of 800 mosmol/kg is accepted as normal.

2. URINARY ACIDIFICATION—If there is significant acidosis as indicated by very low plasma bicarbonate, and urine pH is more than 5.5, there is no need for further test. If plasma carbonate is normal, ammonium chloride 100 mg/kg body wt. is given in the morning. Urinary pH of 5.3 or less should be found on atleast one sample passed in the succeeding 8 hours.

**Clinical features:**

1. *Initial attack*—(a) Onset—abrupt onset with high fever, headache, pains in muscles and joints, nausea, vomiting, photophobia and sometimes epistaxis. (b) Temperature rises quickly to 104° to 105°F, and except for slight morning remissions, remains elevated throughout the initial febrile period which lasts for about 7 days at end of which it falls by crisis. (c) Rash and rose coloured spots may occur on trunk and limbs most marked in the region around the neck. (d) Nervous symptoms—delirium, insomnia, symptoms resembling encephalitis or meningitis. Rarely optic atrophy, hemiplegia, aphasia, etc. Spirochetes may be demonstrated in the C.S.F. (e) Alimentary—Nausea, vomiting containing perhaps bile. Constipation common in severe cases; diarrhoea, abdominal pain and hematemesis. Liver may be enlarged and tender. Jaundice not uncommon. Spleen enlarged and tender. (f) Termination—Ends abruptly with profuse sweating and rapid fall of temperature to normal or below. In elderly or weak patients collapse may occur.
2. *First period of apyrexia*—3 to 10 days. Symptomless.
3. *First relapse*—Recurrence of some of the symptoms, usually milder. Jaundice more common. Conjunctivitis. Duration less than initial attack.

Subsequent relapses—In tick transmitted infection; usually shorter and milder than previous febrile periods.

| *Louse borne fever* | *Tick borne fever* |
|---|---|
| Epidemic. | Endemic. |
| Common in adults. | Common in children. |
| Febrile period longer. | Febrile period of shorter duration. |
| Relapses not more than 3. | Relapses numerous. |
| Mortality higher. | Mortality lower. |
| Spirochetes easily found in blood film. | Spirochetes not readily seen. |

Diagnosis—Demonstration of Borreliae in peripheral blood Repeated examinations may be required especially in tick-borne disease.

Treatment—Louse-borne fever—PAM 600,000 units IM or same dose of procaine penicillin repeated after 24 hours. Danger

*Location of kidney*—The surface markings of the kidney can be taken from IVU. A point 2 cm below the 12th rib and between vertical line through the lower pole of the kidney and a vertical line through the lateral borders of the kidney is chosen.

*Biopsy technique*—The patient is asked to lie prone. The skin around the biopsy site is sterilised. Local anaesthetic is injected into skin and subcutaneous tissue. A spinal (lumbar puncture) needle is used to locate the kidney. The patient must hold his breath while the needle is being advanced to prevent laceration of the kidney. Once in the kidney the needle will swing on respiration. The needle is then withdrawn until it no longer swings with respiration, and more local anaesthetic injected outside the renal capsule. The needle is now removed and a skin incision made. The biopsy needle is now inserted, the needle being moved further only while the patient holds his breath The needle is advanced gently through the renal capsule. The obturator of the exploring needle is then removed and the cutting needle inserted. The patient is then asked to take and hold a deep breath while the cutting needle is advanced firmly on up to the hilt of the exploring needle. The head of this needle is held steady with the left hand while the exploring needle is pushed down with the right to complete the biopsy. Both needles are withdrawn and the biopsy recovered from between the blades of the cutting needle. Tissue is divided to provide material for histology, immunofluorescent studies and electron microscopy.

*Post-biopsy care*—Plaster is put on the incision and patient is asked to roll over gently and lie on his back. Fluid intake should be encouraged except in the anuric or oliguric patient. Pulse and B. P. should be measured every 15 minutes for 4 hours and then hourly for the next 20 hours.

Patient can be discharged after 48 hours.

**Complications**—

1. *Failure to locate the kidney.* The procedure should be repeated while screening the patient after injection of contrast medium, or in patients with poor renal function ultrasound may be a better guide 2 *Puncture of another organ*—such as liver, spleen, pancreas or rarely colon. 3. *Perinephric hematoma*—is common. It may cause pain, a palpable mass or signs of blood loss. 4. *Hematuria*—is frequent and as a rule self-limiting Renal colic may occur. 5. *Arteriovenous fistula*—is not uncommon. A bruit will be heard over the kidney. It is of little clinical significance.

supratrochlears. Involvement of intra-abdominal lymphatics may produce clinical appearances of acute abdomen.

Secondary Gram-positive bacterial infections cause supurative lymphadenitis or abscess formation particularly in the breast, or in muscle resembling tropical pyomyositis.

3. *Late obstructive phase*—following inflammatory reactions or sometimes without previous local inflammation. Obstructive signs include varices of local lymphatic vessels usually of femoral, inguinal and testicular regions, of the abdomen, lymph scrotum and hydrocele and rarely ascites, pleural effusion and synovitis. Obstructed varicose lymph vessels in abdomen may rupture giving rise to chyluria, small amount of blood or clots often accompany the chyluria. Massive lymphoedema (Elephantiasis) is seen sometimes distal to the blockage. Thickening of both skin and overlying tissues. One or both legs and scrotum most commonly involved. Upper extremities, breast and labia may also be affected.

LABORATORY DIAGNOSIS—(i) *Microfilariae in peripheral blood*—examined about midnight. Microfilariae may be found in fluid obtained from varices, from hydrocele sac and sometimes ascitic and pleural accumulation and joint fluid or sediment of chyluria. (ii) *X-ray*—for calcified filaria. (iii) *Gland biopsy*—to identify adult worm. (iv) *Intradermal test*—About 90% of patients with Wuchereria bancrofti infestation have a positive intradermal test with material prepared from filarial worm of lower animals. (v) *Complement fixation test*—A positive reaction is an indication of present or past infection.

**Management:**

1. *Specific*—Diethylcarbamazine—Produces rapid disappearance of microfilariae from blood stream. Dose—50 mg. t.d.s. for 3 or 4 days to maximum of 200 mg t.d.s. for 2 weeks. (Total dose 75 mg/kg body weight). *Side effects*—Dizziness, nausea and vomiting. Fever, bodyache, skin rashes and temporary exacerbation of symptoms may occur in the beginning of treatment as a result of toxic proteins released from dead organisms. These allergic reactions do not indicate cessation of treatment and are relieved by corticosteroid drugs.
2. *Treatment of secondary infection*—(a) Local treatment—elevation of limb. Calamine or lead lotion. Antibiotic

The fauces are greatly congested with oedema and there is foul smelling breath. Lymph-node enlargement and oedema of connective tissues gives rise to classical *bull-neck* appearance. In extremely ill patients there may be bleeding from nose and throat and petechiae may be seen in the skin. The temperature may be normal or slightly elevated but the pulse is rapid and thready.

**Laryngeal diphtheria**—More common in infants. Initial symptoms are hoarseness, brassy cough and noisy breathing. Progressive laryngeal obstruction produces inspiratory stridor. Lower intercostal spaces are sucked in as not enough air flows in to fill the lungs. If not relieved child dies of hypoxia.

2. NON-RESPIRATORY GROUP—include vulva, vagina, umbilical cord, conjunctiva, auditory meatus, tongue and cutaneous wounds, oesophagus. Glands or coronal sulcus of penis after circumcision in infants.

**Complications of diphtheria :**

1. TOXEMIA—Rapid thready pulse, limpness, apathy, and drowsiness or less often restlessness, headache, occasional vomiting.

2. CARDIOVASCULAR—

   (a) *Peripheral failure*—at the end of first week in severe cases, or during second week. Restlessness, vomiting, pallor, cold and clammy skin, thready pulse, and fall of B.P. (b) *Myocarditis*—usually during second week. Clinical features consist of vomiting, dyspnoea, pallor, tachycardia, gallop rhythm and signs of congestive heart failure. Arrhythmias particularly ventricular extra-systoles and conduction disturbances are common, and are probably responsible for sudden death.

3. PARALYSIS—

| *Paralysis* | *Time of onset* | *Signs* |
|---|---|---|
| *Palate* ... | 3rd week | Nasal twang, nasal regurgitation of fluid, immobility of palate by 'Ah' test |
| *Ocular muscles* ... | 3rd-5th week | Paralysis of accommodation, blurred vision, rarely squint and ptosis. |
| *Face* ... | 5th-6th week | Paresis or paralysis of face, unilateral or bilateral. |

"ground itch" or "water sores". A generalised urticarial rash may occur during the development of the parasite in the body. Skin often dry and of a pale earthy colour. Hair dry and scanty. Oedema of feet.

2. *Gastro-intestinal symptoms*—In acute cases epigastric discomfort and tenderness, diarrhoea with perhaps passage of blood and mucus. Wash-leather appearance of tongue, protuberant abdomen. A curious craving, manifested by geophagy (eating of earth) often develops; supposed to be due to desire to neutralise hyperacidity of stomach with alkaline earth. Malabsorption syndrome occasionally occurs.
3. *Circulatory and respiratory*—Palpitation, breathlessness on exertion, pulsation of neck veins, cardiac enlargement, functional murmurs, tachycardia, low B.P. There are at times cough and bronchial symptoms induced by the irritation of the larvae in the pulmonary alveoli during the course of migration.
4. *Nervous system*—Physical and mental tiredness. Dimness of vision and night blindness. At times hypochondriasis and in severe cases melancholia.
5. *Blood*—Anemia most striking, hypochromic microcytic. In some cases there occurs a superadded folic-acid-deficient megaloblastic anemia.

*Diagnosis*—Detection of ova in stool, or of worms after treatment.

TREATMENT—When Hb is less than 5 gm. % it is advisable to raise it to about 8 gm. % before expelling the worms.

*Bephenium hydroxynaphthoate* (Alcopar)—Effective and safe, more effective against A. duodenale than against N. americanus. Single dose of 5 g. of the granules (2.5 g. of base) by mouth in half glass of water or any sweet liquid on empty stomach (for children under 2 half the above dose). Toxic effects—minimal. Nausea and vomiting may occur, sometimes diarrhoea.

*Tetrachlorethylene*—Single dose of 0.1 ml./kg. (Maximum adult dose of 5 ml.) is given in morning on empty stomach (preferably as mucilage rather than in capsule form) and food withheld for 3 hours afterwards. Alcohol and fat should be avoided for 24 hours before and after treatment. No purgative necessary. Repeat treatment at four-day intervals to cure heavy infection. Toxic effects—burning in epigastrium, abdominal pain, nausea and vomiting. Occasionally drowsiness,

| *Diphtheria* | *Follicular tonsillitis* |
|---|---|
| Pillars of fauces and uvula may be involved. | Deposit limited to tonsils. |
| Fever usually slight | Fever high. |
| Cervical glandular enlargement rare. | Cervical glands commonly enlarged. |

2. *Moniliasis*—Most common in infants, patches of soft deposit of fungus on buccal mucosa and tonsils. Exudate white and characteristically arranged as small linear membranes. Monilia albicans will be seen on smear.
3. *Vincent's angina*—Gingivitis with ulceration, no toxemia, marked foetor of breath, presence of fusiform bacillus and spirillum.
4. *Infectious mononucleosis*—occurs usually in older children. Exudate as a rule remains white. Glands in neck enlarge but remain discrete. Patient usually less ill.
5. *Agranulocytosis*—Gingivitis with ulcerating membranous lesions of tonsils, palate, or gums. Fever and malaise. Diagnostic blood picture.
6. *Acute leukemia*—Hemorrhages, enlargement of spleen, liver and lymph glands.
7. *Post-tonsillectomy slough*—No tendency for lesions to spread.
8. *Quinsy*—Usually unilateral, glands enlarged and tender.
9. *Mumps*—may simulate periadenitis of diphtheria but swelling in mumps fills up posteriorly the depression between angle of jaw and mastoid process. Orifices of Stensen's ducts injected, no membrane, no toxemia.
10. *Secondary syphilis*—Glairy deposit on tonsils. Hoarseness due to laryngitis
11. *Leukoplakic patches*—Seen mainly in men over 40 years of age White patches also on gums, cheeks or dorsum of tongue.
12. *Scarlet fever*—Tonsillo-pharyngitis may be membranous or ulceromembranous Typical rash.

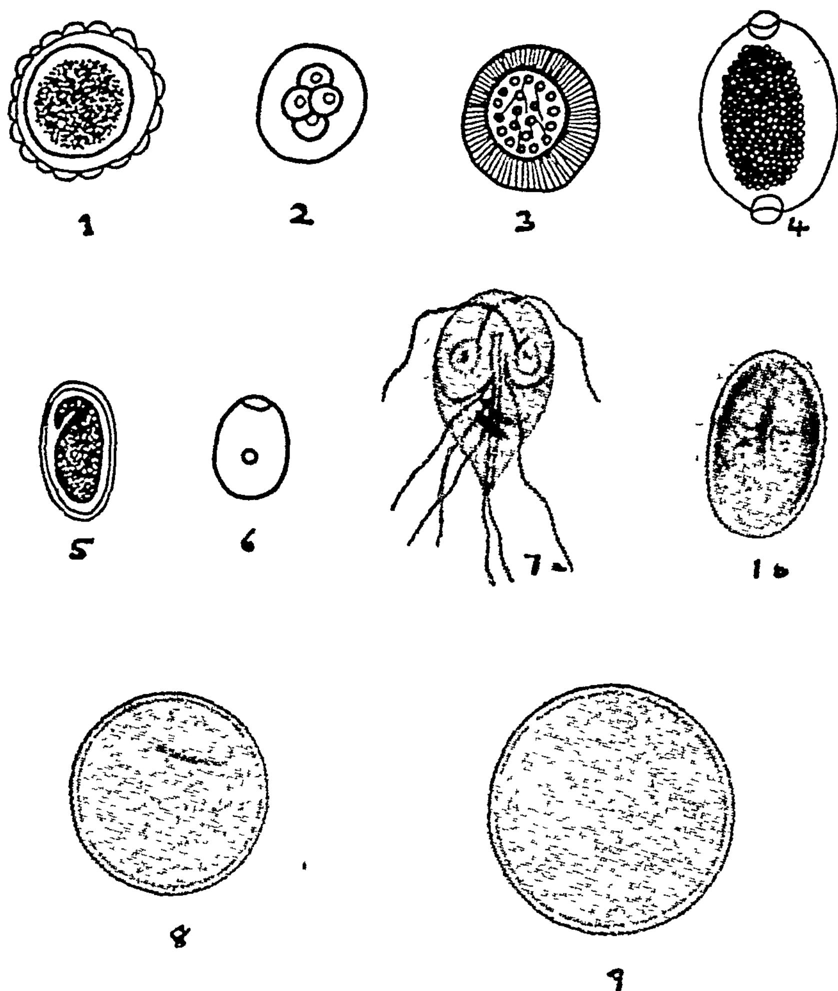
**Laryngeal diphtheria—**

1. *Acute catarrhal laryngitis*—Few constitutional symptoms, catarrh dominant, slight obstructive signs, usually no paroxysms.
2. *Measles*—Catarrhal symptoms. Koplik's spots, no membrane; later rash.
3. *Acute bronchiolitis*—Affects children mainly under 2 years of age. Initial non-specific upper respiratory infection

features of cholecystitis or pancreatitis. Worms that migrate from bile duct to hepatic duct and from there into the substance of the liver may die and form the focus of a hepatic abscess Occasionally worms migrate to the stomach and are vomitted, or migrate to unusual sites, such as the pharynx and are inhaled or block the Eustachian tubes.

TREATMENT :

*Levamisole*—may be considered drug of choice. Single dose of 2·5 mg./kg of body weight. Adverse reactions mild and transient—nausea, vomiting, anorexia, abdominal discomfort, headache or dizziness.




Eggs of common intestinal worms.
1. Ascaris lumbricoides. 2 Ankylostoma duodenale. 3. Taenia saginata. 4. Trichuris trichura. 5. Enterobius vermicularis. 6 Diphyllobothrium latum. 7a. Giardia lamblia trophozoite. 7b G lamblia cyst 8. Cyst of E. histolytica. 9. Cyst of E. coli.

or headache with aspirin and codein. Saline throat gargles. Ice collar soothing if swelling of cervical lymph nodes.

2. *Antitoxin*—should be given as early as possible by IV drip or IM injection or half IV and half IM as a single dose. Dose for children and adults same. Antitoxin schedule—(a) No previous serum administration, no history of allergy —Total dose according to site and extent of membrane as single dose. (b) Previous serum administration without reaction and no history of allergy—0.2 ml. undiluted serum subcutaneously. If no general reaction within 30 minutes, test again with 0.2 ml. undiluted serum before giving full dose. (c) Previous serum sickness—0 2 ml 1 : 10 dilution of serum subcutaneous. If no general reaction within 30 minutes test again with 0.2 ml. undiluted serum before giving full dose. (d) Asthma, eczema, or previous accelerated or anaphylactic reactions—Serum should not be given unless overwhelming indication. Give Prednisolone 20 mg. orally and Promethazine 50 mg. IM half hour before first injection. Keep adrenaline ready in a syringe. Start with 0.2 ml. 1 : 100 dilution of serum subcutaneous. If no reaction after 30 minutes follow with 1 : 10 undiluted serum. Subsequently double the dose every 30 minutes until total dose is given. (e) On recovery from attack of diphtheria it is important to ensure that the patient is fully immunised against tetanus.

| *Variety of diphtheria* | *Dose of antitoxin (single dose units)* | *Variety of diphtheria* | *Dose of antitoxin (single dose units)* |
|---|---|---|---|
| Nasal .. | | Nosopharyngeal .. | 60,000 |
| Tonsillar (unilateral) ... | 20,000 | | |
| Tonsillar (bilateral) | 40,000 | Laryngeal ... | 40,000 |
| Pharyngeal ... | 60,000 | Laryngeal and nasopharyngeal . | 80,000 |

If improvement in local or general condition of the patient is not apparent within 24 hours, more antitoxin may be administered, or 10,000-20,000 units may be given daily till the patch disappears However a sufficiently large and adequate dose at the start is enough and there is no need to repeat the injections. An excess of antitoxin

sult in further pressure symptoms. Other sites—Liver and lung may be involved.

TREATMENT:

*Niclosamide* (Yomesan)—Adult dose 2 g. as two divided oral doses with one-hour interval between the doses. The tablets should be chewed thoroughly and washed down with some water. Only fluids should be taken from the evening before treatment. In T. solium infection an antiemetic should be given before starting treatment, and a saline purge should be given 2 hours after the tenicide to rid the bowel of all dead segments before digestion can occur. Side effects—only mild gastrointestinal disturbance.

*Dichlorophen*—75 mg./kg. with maximum of 6 g. for adults either as single dose or divided doses. Side effects—nausea, colic, diarrhoea, rarely jaundice. The drug has been superseded by niclosamide.

*Mepacrine*—200 mg. every 10 minutes for 4 doses.

**Threadworm or pinworm:** (Enterobius vermicularis)—are common parasites. The adult threadworms live in the colon and rectum, and the gravid female emerges from the anus to deposit the eggs on the surrounding skin. These eggs if swallowed liberate the contained larvae which mature as they pass down the intestine.

*Symptoms*—Minimal except for anal and perianal itching. Heavy infestation may cause insomnia due to pruritus, anorexia and abdominal discomfort, whilst female children are liable to develop vulvovaginitis.

*Diagnosis*—The presence of eggs can be demonstrated by applying adhesive cellophane tape to the perianal skin for microscopic inspection at night, removed and examined the next morning.

TREATMENT—*Piperazine compounds* (see roundworm infection) 75 mg./kg. body weight daily for one week; a two week course gives better results.

*Vyprinium embonate* (Vanquin)—in single dose of 5 mg./kg. body weight. Can be repeated after one week.

*Mebendazole*—Single oral dose of 100 mg., repeated after one week.

Adjuvant measures—to prevent reinfection Nails should be cut short and gloves and close-fitting sleeping drawers should be worn at night. Child's hands must be scrubbed with brush

whooping cough-like diseases are due to common respiratory viruses.

*Incubation period*—7-14 days.

**Clinical features:** 3 stages, each lasting about 2 weeks.

1. CATARRHAL (PRE-COUGH) STAGE—Insidious onset with coryza, moderate or mild cough and slight fever. The cough which is single at first, becomes progressively grouped and paroxysmal and more intense. No signs in chest, or bronchitic signs.

2. PAROXYSMAL (SPASMODIC) STAGE—follows with repeated episodes of short staccato cough during which the child is distressed, red faced or deeply cyanosed with bulging tear-filled eyes. As the glottis relaxes after the spasm, the older child takes a respiratory whoop which is often absent in the neonate. The paroxysm may comprise a single bout of coughs with terminal whoop, or the whole paroxysm may be punctuated by whoops and cease only when the child ejects mucus and food debris by vomiting, or coughing up, or swallowing large amount of thick mucoid sputum. After the attack, the child exhausted often goes to sleep or returns to play. *Exciting causes*—Feeding, excitement, activity, sudden change in temperature or sometimes no obvious cause.

3. CONVALESCENT STAGE—About the 4th week, paroxysms diminish in intensity, child ceases to vomit, then to whoop, and finally to cough. Appetite returns with improvement in general nutrition.

*Laboratory diagnosis*—(i) Absolute lymphocytosis. (ii) Isolation of B. pertussis from upper respiratory tract by cough-plate culture method or preferably nasopharyngeal swab method on Bordet-Gengou medium. (iii) Normal ESR in uncomplicated whooping cough.

**Differential Diagnosis:**

1. *Bronchiolitis or bronchopneumonia*—In whooping cough there is history of contact, gradual onset of catarrhal symptoms progressing to spasmodic phase.
2. *Enlarged tracheo-bronchial lymph nodes*—usually tuberculous. Paroxysmal cough but no whoop.
3. *Foreign bodies in larynx or trachea*—Rapid onset. Endoscopic examination reveals source of trouble.
4. *Tetany with upper respiratory infection.*

The adult worms dwell in the large intestine with their thin anterior ends buried in the mucosa. Ova leave the intestine in the stools and after about 2 weeks are infective if ingested.

*Diagnosis*—Brown barrel-shaped eggs with a plug at each end in the stools.

*Treatment*—Thiobendazole 200 mg. t.d.s. for 5 days, or Mebandazole 100 mg. b.d. for 3 days.

## 17. TROPICAL SPRUE

**Definition**—It is an alimentary dysfunction characterised by deficiency in gastric secretion and inability to absorb adequately fat, glucose, calcium and certain other food constituents and characterised by morning diarrhoea, bulky gaseous stools, sore tongue, megalocytic anemia and wasting.

**Etiology**: *Age*—usually middle age. *Sex*—more in females especially when pregnant. *Geographical distribution*—tropics and subtropics and mainly in hot, damp coastal climates. *Season*—Onset usually after rains. *Race*—mostly amongst European. *Other predisposing causes*—prolonged residence in endemic area and hills, chronic dysentery, mucous colitis or hill diarrhoea. *Cause*—An alimentary dysfunction in which a series of interlocking pathophysiologic events occur.

**Clinical features**:

1. Onset—History of dysentery followed by troublesome diarrhoea, insidiously progressive; occasionally only sore mouth (Tongue or mouth sprue). Rarely rapid and severe onset.
2. Sore mouth—Red beefy clean tongue with superficial erosions in early sprue; a "strawberry" appearance of the tongue may be produced by the general reddening and swelling of some papillae and atrophy of others. Excessive salivation and stomatitis.
3. Dyspepsia—Heaviness and distension after meals. Borborygmi. Peristaltic waves may be visible. Liver dullness diminished.
4. Diarrhoea—Morning diarrhoea with one or two copious, pale, pasty, sometimes watery, fermenting, acid stools with occasional attacks of loose stools throughout the day.
5. Emaciation—Wasting may sometimes continue in spite of improvement in diarrhoea and stomatitis.
6. Pigmentation of skin.
7. Anemia—Megaloblastic hyperchromic. May develop early, occasionally presenting sign. In some cases there may be

drops can be given on a sugar lump or with little milk at 4-hourly intervals. Salbutamol t.d.s. if associated bronchospasm. (c) *Antibiotics*—mildly effective in early catarrhal stage for reducing paroxysms, and to check secondary infection. Tetracycline or erythromycin—Dose per day—under 1 year 1 gm., upto 3 years 1·5 gm., upto 10 years 2 gm., in four divided doses for 10 days. Ampicillin and cephaloridine for bronchopneumonia. (d) Anticonvulsants—such as IV diazepam or IM paraladehyde for fits, subsequent protection with sodium valproate or phenobarb.

3. *Oxygen*—by nasal catheter or oxygen tent if convulsions or persistent dyspnoea.

## 3. MENINGITIS

**Classification :**

1. *Bacterial*—Common—Meningococcal, pneumococcal, tuberculous, influenzal. Rare—Staphylococcal, streptococcal, Listeria monocytogenes, mima polymorpha, cryptococcus neoformans, B. pyocyaneus.
2. *Viral*—(a) Benign lymphocytic meningitis. (b) Enteroviruses—echovirus, coxsackie, polio. (c) Meningitis complicating mumps, glandular fever, lymphogranuloma venereum, viral hepatitis, herpes simplex, variola-zoster virus
3. *Spirochetal*—(a) Acute syphilitic meningitis. (b) Leptospiral meningitis.
4. *Mycotic*—Actinomycetes, aspergilli, leptothrices, sporotricha.
5. *Parasitic*—Amoebiasis, trichiniasis, trypanosomiasis, torula (yeast).
6. *Aseptic meningitis*—(a) Viral (See above). (b) Non-viral—(i) Bacterial infection adjacent to meninges. (ii) Specific infections in which organism is difficult to isolate. (iii) Neoplastic invasion.

**Clinical Features :** In meningitis of any etiology the clinical features relate to three causes :

1. *Features of infection*—Fever, rigors, leucocytosis.
2. *Features due to increased intracranial pressure*—Headache, nausea, vomiting, deterioration of consciousness and convulsions.
3. *Features of meningeal irritation and inflammation*—Neck rigidity, positive Kernig's sign, photophobia.

2. *Diet*—High protein, low carbohydrate and low fat. (a) Milk diet—Skimmed milk or proprietary dried milk; or protein hydrolysates and concentrates; 2 hourly feeds. Fruits and glucose. (b) Mixed diet—Skimmed milk, eggs, meat, bread, green vegetables, fresh fruits, and milk pudding.
3. *Folic acid*—effect most marked in cases with prominent megaloblastic anemia 30 mg daily by mouth or 15 mg. I.M. for 3 weeks controls diarrhoea and causes improvement in stomatitis and glossitis. Maintenance dose of 5 mg. b.d. The effect on fat absorption defect is minimal.
4. *Antibiotics*—Short course of treatment with broad spectrum antibiotics such as oxytetracycline 250 mg. q.d.s. by mouth can be effective in producing clinical improvement.
5. *Corticosteroids*—may be tried if folic acid therapy fails. Prednisolone 50 mg. per day for 7 days, dose gradually reduce to 15 mg. per day.
6. *Treatment of anemia and other deficiencies*—(a) Vitamin $B_{12}$ 50-100 micrograms twice a week together with folic acid for optimal hemopoietic response (b) Vitamin B complex by mouth or injection. (c) Pancreatic enzyme tablets 0.4 gm. b.d after meals. (d) Calcium salts and vitamin D. (e) Transfusions may be required in severely anemic patients.
7. *Symptomatic treatment*—(a) Diarrhoea—Calcium salts may lessen diarrhoea and improve the appearance of stools in patients in whom the fat absorption is especially poor. Sulphonamides and antibiotics are effective in controlling diarrhoea in early cases especially in those passing watery stools. (b) Flatulence—Dilute hydrochloric acid 1/2-1 dr. in water with meals. (c) Emaciation—protein hydrolysate 5% in 1,000 ml with 5% glucose I V., glucose 200 ml. 25% I.V. (d) Stomatitis—Application of glycerin-borax with cocaine if pain, or alkaline mouth wash, or astringent gargles. (e) Tetany—calcium.

## 18. EFFECTS OF HEAT

**Clinical manifestations:**

1. **Heat stroke** (Sunstroke, heat hyperpyrexia)—Characterised by sudden loss of consciousness which may be preceded by prodromal signs typical of cerebral irritation—headache, dizziness, nausea, convulsions, and visual disturbances. Failure of the heat regulating centre gives rise to high fever and cessation

damage—e.g., deafness. (c) Psychiatric problems and mental retardation. (d) Hydrocephalus—rare.

4. *Cardiovascular*—Myocarditis.
5. *Waterhouse-Friderichsen syndrome*—from hemorrhagic necrosis of both adrenals. Circulatory failure, cyanosis and widespread petechiae or purpura. Circulating steroid levels are usually high.
6. *Disseminated intravascular coagulation*—often present.

II CHRONIC MENIGOCOCCAL SEPTICEMIA—rare. It consists of petechial skin eruptions, arthritis or arthralgia, and low grade pyrexia and represents an unusual example of host parasite relationship, possibly caused by IgM deficiency. This chronic state may be complicated by meningitis

**Differential Diagnosis:**

I. OTHER TYPES OF MENINGITIS—

1. *Purulent meningitis*—
   (a) *Pneumococcal*—usually associated with lobar pneumonia, rarely with chronic otitis media, sinusitis or head injury. Muscular spasms common. More severe toxemia. C.S.F. thick greenish fluid. Gram positive cocci on smear.
   (b) *Hemophilus influenzae meningitis*—common in children under 5. Preceding or accompanying infection of the respiratory tract. Illness evolves in a few days with vomiting, diarrhoea and fever. Neck stiffness and Kernig's sign may not be conspicuous. C.S.F. purulent with a high protein and polymorph count and low sugar. Gram-negative bacilli can be seen and grown on culture.
   (c) *Streptococcal or staphylococcal*—usually complicating otitis media, skull fracture, congenital defect such as meningocele or septicemic infection. CSF thin, yellow turbid fluid.
   (d) Amoebic meningo-encephalitis—Rarely a purulent CSF is due to infection with free-living amoebae of the genus Naegleria The disease occurs in young adults who have been swimming It is a rapidly progressive disease.
2. *Tuberculous meningitis*—Longer history with vague symptoms of malaise, anorexia, sweating and fever suggesting tuberculous toxemia. Cranial nerve palsies common. Fundoscopy may show choroid tubercles. CSF clear or slightly opalascent with predominant lymphocytes. Ziehl-Neelsen stained sample may show presence of acid/alcohol-fast bacilli.
3. *Acute syphilitic meningitis*—(a) Mostly young men; (b) history of primary infection 1-2 years ago; (c) may follow

## 19. ENDEMIC FLUOROSIS

**Definition**—Endemic fluorosis is a disease entity resulting from ingestion of excessive quantities of fluoride in drinking water over a prolonged period. It primarily affects hard tissues of the body manifesting as mottling of enamel and osteosclerosis of the skeleton.

**Factors influencing toxicity of fluoride:**

1. *Fluoride concentration of drinking water*—is the most important factor.
2. *Duration of exposure.*
3. *Occupation and sex*—Most cases of skeletal fluorosis occur in those doing hard manual labour. Incidence is higher in males.
4. *Nutrition*—Poor nutrition particularly lack of proteins and calories.
5. *Climate*—Hot climate favours increased ingestion of water which may contain excess fluorine.

**Clinical features:**

1. *Dental fluorosis*—'Mottled enamel' due to dental hypoplasia with areas of hypocalcification. Besides brownish discolouration there is pitting of enamel surface.
2. *Skeletal fluorosis*—(a) Symptoms—Pain and rigidity of spine and later on of joints. Paresthesia in limbs. (b) Skeletal changes—Irregular bone deposition may be felt as exostosis along anterior borders of tibia, near tibial tubercle, olecranon and along medial border of scapula and near the vertebral spinous processes. Fixed flexion deformity from ossification of interosseous membrane of forearm and leg. Kyphosis.
3 *Neurological complications*—(a) Due to compression of spinal cord—Paresthesiae with patchy sensory involvement, weakness, wasting and fasciculations with spasticity and loss of sphincter control. (b) Uncommon features—Cerebrovascular insufficiency or cerebellar ataxia from compression of vertebral artery in spine, peripheral neuritis, headache, nerve deafness.
4. *Soft tissue lesions*—(a) Thyroid goitre due to iodine deficiency since fluorine competes with iodine. (b) Kidney failure whilst fluorine is excreted. (c) Anemia. (d) Monckeberg's atherosclerosis.

| *Meningitis* | *Meningism* |
|---|---|
| Kernig's sign present. | Kernig's sign usually absent. |
| Cranial nerve palsies common. | Cranial nerve rarely affected |
| C.S.F. shows definite changes. | Increased pressure of C.S.F. with moderate reduction in protein and chloride content. |

III. CERTAIN DISEASES OF CNS—

1. *Poliomyelitis* (in the early 'meningeal phase')—usually of short duration, meningeal signs not marked, hyperaesthesiae common, paralysis common and more extensive. Lumbar puncture at once differentiates.
2. *Acute disseminated meningo-encephalitis*—due commonly to herpes simplex virus. Begins with features of acute meningitis and progresses rapidly to irritability, confusion, focal fits, coma and death.
3. *Post-viral menigo-encephalitis*—Rare complication which may follow smallpox vaccination or occur during recovery phase of measles or influenza, or less frequently chicken pox, mumps or rubella.

**Management:**

1. SPECIFIC—Benzyl penicillin drug of choice; initially 12-20 mega units/day IV in divided doses. Sulphadimidine (Sulphamezathine) 8-12g/day may be given in addition if indicated by bacterial sensitivity. If allergy to Penicillin, give Chloramphenicol 1 g 6-hourly.
2. GENERAL—(a) Quiet, well ventilated room to avoid external stimuli. (b) Frequent change of position to avoid hypostatic congestion. (c) Diet—mainly fluids. If patient semiconscious, nasal feeds and intravenous glucose-saline to prevent dehydration.
3. SYMPTOMATIC—(a) Headache and restlessness—sedatives, lumbar puncture. Lowering of increased intracranial pressure with—(i) Steroids—8 mg. dexamethasone IV every 8 hours. (ii) Mannitol—25 gm. in 250 ml. over a period of 1-2 hours. (b) Retention of urine—Carbachol or catherization. (c) Constipation—Enema. (d) Vascular collapse or shock—100 mg. hydrocortisone IV every 6 hours.

# 10. Diseases of Children

## 1. GROWTH AND DEVELOPMENT

**Definition**—It is a process by which the fertilised ovum attains adult size. Growth implies changes in the size or in the values given certain measurements of maturity. Development encompasses other aspects of differentiation of form or function including emotional and social changes as a result of environmental interaction.

**Factors affecting growth and development:**

1. *Genetic*—A legacy of biologic potential influenced by environment.
2. *Hormonal*—Growth hormone and its peripheral action compounds (somatomedins), thyroxine, insulin, sex steroids.
3. *Growth factors*—Nerve growth factor, cartilage factor, fibroblast growth factor and others with undifferentiated actions.
4. *Trauma*—Prenatal or postnatal including infection, chemical or physical trauma or immunologic
5. *Nutritional failure*—Antenatal malnutrition leads to IUGR and low birth weight which influences growth potential throughout life. Postnatal PEM (protein energy malnutrition), iron deficiency.
6. *Socio-economic factors*—Closely influence nutrition, infection, developmental stimulation.
7. *Emotional factors*—modify growth potential. Deprivation leads to "emotional deprivation syndrome" which can stunt physical and psychological development. Position of child in family, interaction of parents and child, child rearing patterns influence growth.
8. *Culturopolitical factors*—may limit development potential by establishing conventional behaviour patterns and expectations and alter schedule for acquisition of motor and intellectual skills.
9. *Intellectual stimulation and learning.*

on the 2nd or 4th day signs of pneumonia begin to develop with copious fine crepitations usually basal. The sputum may be pinkish, frothy and copious, or tenacious mucus of several hues; (iii) a late form in which often after apparent recovery from the primary influenza, pneumonia suddenly supervenes on the 4th to 10th day after the onset.

3. *Gastro-intestinal type*—Temperature rarely above 37.5°C, severe anorexia and vomiting, abdominal discomfort and constipation and general prostration. Tympanitis, diarrhoea and continued fever may simulate typhoid fever.
4. *Malignant type*—Severe toxemia, cyanosis and rapid cardiac failure. Always fatal.
5. *Nervous type*—Headache sometimes very severe, delirium, intense depression which may continue for a long time after the acute illness. A true meningitis may occur.

**Complications and sequelae:**

1. *Respiratory*—Bacterial bronchopneumonia or lobar pneumonia, less often pure viral pneumonia. These may be concurrent with initial viral infection or follow after an interval. Staphylococcal pneumonia is a serious sequel and may be fatal, less severe infections may result in lung abscess.
2. *Nervous system*—Post-influenzal psychoses, insomnia, irritability, polyneuritis, neurasthenia, meningitis and hemorrhagic encephalitis.
3. *Circulatory system*—Myocardial weakness, cardiac dilatation, irregularities, pericarditis, endocarditis.
4. *Suppuration*—Otitis media, mastoiditis, sinusitis.
5. *Miscellaneous*—Thrombophlebitis, arthritis, orchitis, myositis, nephritis, intestinal hemorrhage.

**Management:**

1. Complete rest in bed.
2. Analgesics and sedatives.
3. Nose drops and throat gargles, or steam inhalations for congestion of nose and throat. Cough suppressive such as codein.
4. Antibiotics for secondary infections such as otitis media and pneumonia.

PREVENTION—(a) *Vaccines*—Polyvalent influenza virus vaccine 1 ml. subcut; or 0.1–0.2 ml. intradermally given 1-2 weeks apart gives moderate temporary protection against current strains.

2nd year : 2 cm (48-49 cm)
3rd year : 2 cm (50-51 cm)
4th year : 2 cm (52-53 cm)
Adult : 53-56 cm

Upto 13 months use formula 1/2 × length (cm) + 10 cm.

(4) *Surface area*: It bears constant relation to nutritional factors affecting growth. Best calculated from monograms involving average weight and height. Crude methods are—

Lowe's formula : Surface area ($m^2$) = $\sqrt[3]{wt^2}$ (kg) × 0·1

Simpler formula :

| | |
|---|---|
| 1 - 5 kg | $M^2 = (0.05 \times kg) + 0.05$ |
| 6-10 kg | $M^2 = (0.04 \times kg) + 0.10$ |
| 11-20 kg | $M^2 = (0.03 \times kg) + 0.20$ |
| 21-40 kg | $M^2 = (0.02 \times kg) + 0.40$ |

(5) *Upper to lower segment ratio* : Upper segment measured from vertex to pubic symphisis. Important in assessment of growth disturbances—proportionate or disproportionate dwarfs. Ratio changes with age and height. Marginal difference between males and females.

| | | | |
|---|---|---|---|
| Premature | > 1.7 | 6 years | 1.14 |
| Ful term newborn | 1.69 | 7 years | 1.10 |
| 1 year | 1 54 | 8 years | 1.06 |
| 2 years | 1.44 | 9 years | 1.03 |
| 3 years | 1.33 | 19 years | 1.02 |
| 4 years | 1.27 | 11 years | 1.00 |
| 5 years | 1.21 | 12 years | 0.98 |

Ratio retarded for age in—hypothyroidism, achondroplasia and other short-limbed dwarfisms, rickets with lower limb deformities.

Ratio advanced for age in—Short trunk dwarfisms, acquired spinal diseases with kyphosis or scoliosis, e g., tuberculosis, hypogonadism (Klinefelter's syndrome), Marfan's syndrome.

(6) *Chest circumference* : Smaller than head circumference by 2-3 cm. Cross-over of head and chest circumferences takes place in Indian children at about 2 years of age (about 1 year in white races).

of cheeks and spread rapidly in a few hours all over the body. Macules appear in crops which by confluence form blotches with crescenteric or thumb nail edge. Fully erupted rash deepens in colour, petechiae may occur. In severe measles the rash is confluent, the face is swollen and disfigured and together with the photophobic eyes creates the typical measly appearance. (b) *Mucous membrane involvement*—includes conjunctivitis, rhinitis, stomatitis, laryngitis, tracheitis and bronchitis. There may also be gastroenteritis.

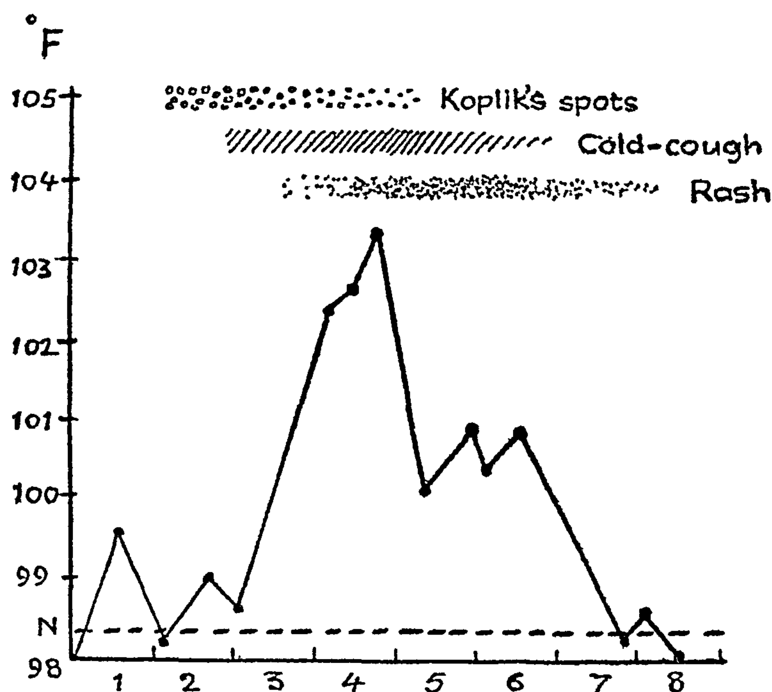



Fig. 8.1 Typical temperature chart in a case of measles. Moderate pyrexia first day, falls on 2nd day, rises to maximum at onset of rash. Falls rapidly as rash commences to fade and normal about 7th day from onset. The onset, intensity and duration of the main symptoms and signs are shown.

3. Stage of defervescence—Temperature falls by crisis or rapid lysis in 24 to 48 hours. Rash fades from the face downwards in the same sequence as its appearance, and leaves brown staining often followed by branny desquamation The more severe the measles, the greater the extent of desquamation. At times the normal rash of measles instead of fading becomes a deep purple (purpuric measles) and this may persist for a week or two.

Table showing brief classification of milestones—

| *Age* | *Motor* | *Adaptive* | *Language* | *Social* |
|---|---|---|---|---|
| Neonatal period (4 weeks) ... | Prone Flexed attitude, buttocks high<br>Supine: Flexed<br>Moro active, grasp, stepping, placing reflexes. | Fixates face in line of vision. Startles with sound. | Cry. | Visual preference for human face. |
| 4 weeks ... | Prone: Legs more extended, buttocks down. Head lift momentary to body plane.<br>Supine: More extended, tonic neck attitude. | Watches person, follows object 45° on one side. | Cry more meaningful, distinguishable hunger, pain. | Body movements with social contact. |
| 8 weeks ... | Prone: Extended attitude. Raises head and sustains in line of body.<br>Supine· Tonic neck posture. Head lags. | Follows object 45° on either side of midline. | Coos in response. | Smiles on contact |
| 12 weeks ... | Prone· Lifts head, arms extended, head above body plane.<br>Supine: Tonic neck posture.<br>Moro's, involuntary grasp, walking and placing reflexes go.<br>Early head control with bobbing motion. | Reaches out for object and misses. Slight palm opening. Follows light 180°. | Makes 'aa' wovel sounds. Listens intently to voice. Cannot localise sound. | Sustained social contact. |

5. *Infectious mononucleosis*—Fever, adenopathy, and sore throat. Maculopapular rash, splenomegaly. Atypical lymphocytes in blood smear.
6. *Roseola infantum* (Exanthema subitum)—Acute viral disease of young children. Three to four days of high fever. As fever falls by crisis, pink maculopapules appear on chest and trunk and fade in 1-3 days.
7. *Erythema multiforme*—Circular or irregular erythematous blotches usually occurring on backs of hands and forearms. Constitutional symptoms may be present.
8. *Paratyphoid*—Sometimes profuse pinkish brown maculopapules. Longer prodromal illness, characteristic temperature chart, agglutination test positive.
9. *Typhus*—Early prostration; mental symptoms; rash bright red, subcuticular mottling, no well defined edges, not marked on face.
10. *Cerebrospinal fever*—Signs of meningitis.
11. *Scarlet fever*—Short prodromal period, sore throat, anterior cervical adenitis, scarlet rash, circumoral pallor and punctuate hemorrhages.

**Management:** Bed rest in quiet shaded room during febrile period. Frequent fluid intake. Acetyl salicylic acid or paracetamol for fever. Irrigation of eyes with boric lotion. Cough linctus to suppress the dry cough. Antibiotics such as ampicillin if complications such as otitis media or pneumonia. Should be given prophylactically to 'poor-risk' children.

PREVENTION—

(a) *Active immunisation*—Single dose of attenuated live-virus vaccine for all children at the beginning of second year of life. Contraindications to the use of the vaccine are—personal history of convulsions, intercurrent illness or recent exposure to other infectious disease, those receiving corticosteroids, or other immunosuppressive agents, leukemia, tuberculosis, and in any stage of pregnancy. Untoward effects—Febrile reaction after one week, sometimes rash. Rarely convulsions and very rarely encephalitis.

(b) *Gamma globulin*—If active inoculation with vaccine is contraindicated and a debilitated child is exposed to the disease. Dose 250 mg. to infants under 1 year and 500 mg. to those between 1-2 years, and 750 mg. to 3 and above.

| | | | | |
|---|---|---|---|---|
| 40 weeks ... | Pulls to standing position. Stands with support. Crawls on fours. | Pincer grasp. Uncovers hidden toy. Retrieves dropped object. Releases objects grasped by others. Looks at pictures. | Repetitive consonants 'mama', 'baba'. | Waves 'bye bye'. |
| 1 year .. | Walks with one hand held or cruises along furniture | Unassisted pincer grasp for small objects; releases object on request or gesture. | 4 to 5 words. May try to imitate spoken word. Understands commands. | Plays simple ball game. Simple postural adjustments to dressing. |
| 15 months . | Walks alone. Crawls upstairs but cannot come down | Inserts pellet in bottle. Makes a line with pencil held like dagger. Tower of 2 cubes. Scribbles. | Jargon. Follows simple commands. May name familiar object. | Gives up bottle. Shows needs by pointing. |
| 18 months .. | Runs stiffly. Walks upstairs one hand held, both feet on step. Explores places. Climbs on chair. Gait broad-based. | Imitates vertical stroke. Dumps pellet from bottle Tower of 3 cubes | Vocalises needs 10 words average. Names pictures. Obeys 2 serial commands. | Feeds self. |
| 2 years ... | Runs well Walks up stairs alternate feet. Downstairs one step at a time. Opens doors. | Tries to draw circle Tower of 6 cubes. Folds paper once. | Puts 3 words in a sentence. Relates experiences. Names animals. 200-300 words. | Sphincter control by day. Helps undressing. |
| 2½ years ... | Climbs down stairs. Kicks Jumps. | Horizontal and vertical strokes, cannot cross them, closes circular figure. Tower of 8 cubes. | Uses pronoun 'I'. Knows full name. Physiological stammer. | Imitates others. "Parallel play". |

TREATMENT—Bed rest and analgesics suffice for the uncomplicated attack. Rubella proven by antibody estimation in first 4 months of pregnancy is a strong indication for termination.

*Prevention*—Live attentuated vaccine should be given routinely to girls of 12-13, women in puerperium who are seronegative should be offered rubella vaccine, but warned that they must avoid pregnancy for 3 months.

**Congenital rubella syndrome**

PATHOGENESIS—Active infection during pregnancy gives rise to a viremia and invasion of the placenta. Secondary invasion of the foetal circulation disseminates virus to foetal tissues. When this takes place at an early stage of development (during the first 4 months) infection is widespread, but when it occurs later, it is more localised, the eye, heart and ear being particularly vulnerable.

DEFECTS PRODUCED BY CONGENITAL RUBELLA: The consequences of rubella in pregnancy are varied and unpredictable, ranging from foetal death to birth of an infected but otherwise normal child.

1. *Temporary damage*—(a) *Thrombocytopenic purpura*—present at birth or appears shortly after and frequently accompanied by evidence of generalised infection. (b) *Liver damage*—jaundice which usually resolves. (c) *Hemolysis*—may occur during first 6 months of life with spontaneous recovery (d) *Low birth weight*
2. *Permanent damage*—
   (i) *Heart*—Severe defect may follow an attack of rubella during second month of pregnancy when the heart is developing. PDA with or without pulmonary stenosis commonest lesion.
   (ii) *Ear*—Deafness is the commonest abnormality and may be the sole finding when maternal infection occurs after first 2 months of pregnancy.
   (iii) *Eye*—(a) Cataract unilateral or bilateral. (b) Retinopathy—due to faulty development of pigmented retinal epithelium.
   (iv) *CNS*—is often involved and virus is readily recovered from CSF.

PROCEDURES TO BE ADOPTED IN A PREGNANT WOMAN—

(a) *Suspicion of having rubella*—Accurate diagnosis should be established by serological tests. If HAI antibody is present,

1. Motor—(a) Gross. (b) Fine.
2. Adaptive—(a) Visual. (b) Auditory.
3. Social.
4. Language—(a) Perceptive. (b) Expressive.

(10) *Sexual maturity*:

| | *Boys* | *Girls* |
|---|---|---|
| 1. Adolescent growth spurt | 13-15 5 yrs | 11.5-14 years |
| 2. Average increase in height | 20 cm After 18 years 2.5 cm remain | 8 cm After 18 years 1-2 cm remain |
| 3. First sign of puberty | Increase in length and colour of pubic hair | Breast bud visible or palpable |
| 4. Age of start of puberty | 12-13 years | 11-12 years |
| 5 Duration of puberty to adult sex characteristics | 4 years | 2-2 5 years to menarche. May be as long as 6 years |

## 2. PREMATURITY AND LOW BIRTH WEIGHT

**Definition**—Babies born before 37 weeks of gestation are called premature (P.M.). Those weighing less than 2500 gm are called low birth weight (LBW) babies. Low birth weight may be due to prematurity or intrauterine growth retardation. The latter group are called small for date (SFD). Premature babies may be small for date also.

**Clinical picture**—(1) Length is short (less than 46 cm.). It is disproportionately short in SFD babies (2) Head appears large compared to the rest of the body, particularly in SFD babies. (3) Only one of the two transverse creases on sole of the foot upto 37-38 weeks. (4) Breast nodule absent upto 33-34 weeks. (5) Scalp hair tends to be short and fuzzy upto 37 weeks. (6) Ear cartilage is poorly developed and the folds of the helix and anti-helix do not stand out till 36 weeks. (7) Testes descends and the scrotal rugae develop after 36 weeks. (8) Sucking and synchronized deglutition develop after 33 weeks. (9) Moro's reflex develops after 32 weeks. (10) Pupillary reaction to light develops after 31 weeks. (11) Blink response to glabellar tap develops after 31 weeks. (12) Strong flexor

weak dettol baths, or wet dressings, loosening of crusts in nose with swabs moistened in oil.

2. *Diet*—Fluid diet consisting largely of milk and glucose drinks.
3. *Symptomatic*—(i) Shock and dehydration—Plasma, glucose saline, corticosteroids. (ii) Hemorrhages—Blood transfusion. (iii) Headache and delirium—Sedatives.
4. *Antibiotics*—Penicillin, ampicillin, erythromycin or tetracycline reduce toxemia, prevent secondary fever, hasten period of scab formation, and lessen the chances of pitting or deformation and of septic complications, pulmonary infection and corneal ulcers.
5. *Antiviral drugs*—(a) *Methisazone* (Marboran)—a synthetic antiviral agent may decrease mortality in severe cases Dose 1.5 to 3 g. b.d. by mouth for 4 days, materially decreases incidence of smallpox after known intimate exposure regardless of vaccination status. (b) *Hyperimmune antivaccinic gamma globulin*—useful in prevention or modification of smallpox in persons known to have been exposed if it is given in the incubation period or in the pre-eruptive phase of the disease.
6. *Corticosteroids*—may be used in severe or potentially fatal form of the disease, e.g., hemorrhagic smallpox.

IMMUNISATION—Smallpox is totally eradicated and there is no need for vaccination in any area.

## 9. SCARLET FEVER

*Causative agent*—Streptococcus pyogenes (Group A) producing erythrogenic toxin.

*Incubation period*—1-5 days.

*Mode of transmission*—Direct contact or droplet infection.

**Clinical features:**

STAGE OF INVASION—Sudden onset with sore throat, fever, headache and general malaise. This stage lasts for 1-3 days. In mild case no symptoms of invasion except sore throat.

STAGE OF ERUPTION—

*Rash*—(i) *Onset and distribution*—Rash commences on second day on neck and upper part of chest and quickly spreads over body and limbs, fading out gradually below the elbows and knees. In a mild case it may be limited to the trunk but in severe cases it is distinct even on palms and soles. (ii) *Character*

2. *Increased load of bilirubin*—(a) RH incompatibility. (b) ABO incompatibility. (c) Hereditary spherocytosis. (d) Glucose-6-phosphate dehydrogenase deficiency.
3. *Enzyme abnormality*—(a) Reduced activity—anoxia, infection, hypothermia, hypothyroidism. (b) Blocking of enzyme action—drugs like vitamin K analogues. (c) Absence or decreased quantity—(i) Genetic type. (ii) Prematurity.
4. *Obstructive jaundice*—(i) Congenital atresia of bile ducts. (ii) Choledochal cyst. (iii) Inspissated bile syndrome.
5. *Other causes*—Congenital familial nonhemolytic jaundice, jaundice due to infections. Breast milk jaundice.

**Clinical manifestations:**

**1. Physiological jaundice—**

Occurs in about 50% of infants. Appears on about the 4th day and lasts from a few hours to about 10 days. Stools retain bile pigment. Physiological jaundice is due to two factors—(i) Breakdown of foetal hemoglobin which occurs with the more efficient method of extra-uterine respiration. (ii) Immaturity of the liver.

*Neonatal jaundice of prematurity*—is more marked and more prolonged than in full-term infants owing to glucuronyl-transferase deficiency. In the absence of Rheusus or ABO incompatibility, this may result from injudicious use of vitamin K analogues, or sulphonamides in premature infants. Also prolonged neonatal cyanosis, bacteremia, and diabetic mother.

**2. Hemolytic disease of the new born—**

(a) *Due to ABO incompatibility* (Icterus neonatorum precox)—Development of jaundice within first 24 hours (before one expects physiological jaundice to become manifest). Serum bilirubin level exceeds 12 mg. per 100 ml. in first 24 hours. No anemia, liver and spleen do not enlarge. Jaundice disappears in 3-7 days. Rarely the disease assumes greater severity, there is more severe jaundice, anemia and hepatosplenomegaly.

(b) *Due to Rh-incompatibility* (Icterus gravis neonatorum)—Jaundice is present from birth or appears within 48 hours. Associated anemia, enlargement of liver and spleen, purpuric hemorrhages. Increasing drowsiness, restlessness, head retraction, twitchings and convulsions may develop and indicate kernicterus, the most serious complication due to destruction of basal nuclei, usually

the skin (glass pox), (ii) elliptical or oval ("tear drop" vesicles) with axis parallel to ribs, (ii) unilocular, hence collapse if pierced with needle. Vesicles turn into pustules in 24 hours. Scabs in 2 to 5 days. (c) *Distribution*—centripetal, i.e. more on upper arms and thighs and upper part of face, and in concavities and flexures. Less commonly lesions on genital mucous membranes, conjunctivae and cornea. (d) *Cropping*—Rash matures very quickly and most spots dry up within 48 hours of appearance. But for 2-3 days new spots continue to appear so that on any area of the body vesicles, pustules and scabs are found side by side (Polymorphism).

(3) *Other symptoms*—Pruritus of varying degree constant and annoying Generalised lymphadenopathy may occur and enlargement of suboccipital and posterior cervical lymphnodes may result from secondarily infected scalp lesions.

UNUSUAL FORMS—

1. *Varicella hemorrhagica*—Hemorrhages into vesicles, skin, subconjunctiva or from intestines. The complication is not due to overwhelming toxemia as in smallpox but due to thrombocytopenia.
2. *Varicella bullosa*—Few or many of the lesions become bullous; common in children with impetigo.
3. *Varicella gangrenosa*—due to infection with hemolytic streptococcus producing the fulminating type, or with diphtheria bacillus causing the subacute type. Necrosis of lesions with toxemia.
4. *Congenital and Neonatal chicken pox*—The virus may pass through the placenta and the baby may be born with chicken pox or develop it in neonatal period.

**Complications:** Rare in children. In adults the disease tends to be more severe and is more likely to be fulminant or complicated by pulmonary involvement.

1. *Secondary infection of skin*—staphylococcal or streptococcal giving rise to erysipelas, cellulitis, furunculosis, impetigo or metastatic abscesses.
2. *Pneumonia*—(a) In children due to secondary infection. (b) Pneumonitis—due to V-Z virus may complicate severe attacks of the disease, particularly in adults or in patients on long-term corticosteroid or immunosuppressive

4. Exchange transfusion if bilirubin level > 20 mg/100 ml in full term babies, and if > 18 mg/100 ml in prematures. It may be carried out at lower levels in premature babies, or if bilirubin level is rising rapidly in presence of evidence of hemolysis.

## 4. HEMORRHAGIC DISEASE OF THE NEW BORN

**Types of neonatal hemorrhage:**

1. Hemorrhagic disease of the new-born due to (i) Low prothrombin level at birth due to deficiency of vitamin K. (ii) Fall of prothrombin on fourth or fifth day after birth. If it falls as low as 15-20% of normal, spontaneous hemorrhages are likely to occur. (iii) Immaturity of liver for formation of vitamin K dependent factors (iv) Relatively low concentration of vitamin K in breast milk.
2. Those resulting from birth injuries, e.g. superficial injuries of scalp, intracranial and visceral hemorrhages.
3. Those due to asphyxia or infection in premature infants.
4. Those secondary to general or local disease, e.g. syphilis, neonatal infections and septicemia.
5. Umbilical bleeding due to mechanical cause, or after separation of the cord from an umbilical polypus, clotting factor deficiencies (especially factor xiii).
6. Thrombocytopenia due to trapping of platelets in big hematomas.
7. Rare blood disease, e.g. hemophilia, congenital thrombocytopenia.
8. Vaginal hemorrhage, usually a manifestation of the genital crisis of the new-born.
9. Swallowed maternal blood.
10. Mother on treatment with coumarin derivatives or dilantin.

**Symptoms and Signs:**

1. *Gastrointestinal tract*—Hematemesis and melena are the most common manifestations. Sudden onset with passage of dark tarry stool on first or second day after birth Stools that follow may consist of almost pure blood Hematemesis occurs in about half the cases and usually follows melena. Infant soon becomes pale and collapsed and may die in a few hours or after 2 to 3 days.
2. *Vagina*—may be the only site of bleeding which is usually slight and continues for 2-3 days.

9. *Bullous eruptions*—of bullous impetigo, pemphigus, and bullous form of erythema multiforme. Iodide or bromide or barbiturate rashes.

**Management**—1. No need to confine patient to bed unless symptoms are severe. 2. For pruritus—Calamine lotion with or without phenol (0.4%) and sedative antihistaminics by mouth. If there is much scabbing, gauze soaked in 1 in 5,000 solution of potassium permanganate solution which is changed every 4 hours may be applied to areas most affected. 3. For secondary infection—Antibiotics. 4. For true varicella pneumonia—Oxygen. 5. For encephalitis—Oxygen and corticosteroids. 6. Antiviral agent—Cytarabine 3 mg./kg./day as rapid IV infusion for 3 days in severe attacks, e.g., associated with varicella hepatitis, pneumonia or purpura fulminans.

PROPHYLAXIS—No preventive measures available. Hyperimmune gamma globulin preferably from patients recently recovered from the disease for modification of the disease in contacts, and in patients with leukemia, those on long-term corticosteroid therapy and for newborn babies whose mothers have contacted chickenpox at or near term.

## 8. SMALLPOX

*Causative agent*—belongs to pox virus group. Smallpox eradication has been achieved throughout the world; there is no evidence that it will return as an endemic disease.

*Transmission*—from man to man and infection results from close physical contact.

*Incubation period*—11 to 12 days.

**Symptoms and Signs:**

STAGE OF INVASION OR TOXEMIA—Abrupt onset, frontal headache, backache usually severe, vomiting and epigastric pain. Fever with sometimes rigors, or convulsions in children. Sore throat, marked prostration, fatigued appearance, insomnia or delirium. This initial stage of toxemia lasts 2 to 3 days. Transient rashes in few cases resembling measles rash or petechial especially over upper thighs or buttocks—"bathing drawers area".

STAGE OF ERUPTION—

*Enanthem*—first to appear. Buccal, faucial, pharyngeal and bronchial mucosa.

3. *Gastro-oesophageal reflux* (Chalasia cardia)—Symptoms between 3rd and 10th day. Regurgitation when infant laid supine; prevented if held up for 30 minutes after feeding. Diagnosis by fluoroscopy.

4. *Congenital oesophageal obstructions*—Oesophageal atresia with or without trans-oesophageal fistula. Symptoms soon after birth—excess mucus at mouth, choking, cyanosis. Failure to pass No. 8 to 10 French soft rubber catheter into stomach confirms diagnosis.

5. *Increased abdominal pressure at birth*—Neonatal ascites, bilateral renal masses.

**Vomiting:**

**Causes:**

1. *Mechanical causes*—Congenital anomalies of GI tract frequent in newborn—ileal, jejunal or duodenal atresia. (b) Imperforate anus (c) Meconium ileus in first 24-36 hours early sign of cystic fibrosis. (iv) Meconium plug—inspissation in distal colon. (v) Intestinal stenosis—duodenal, jejunal, ileal, rectal. (vi) Malrotation. Duodenum obstructed in first 3 weeks. Midgut volvulus. (vii) Pyloric stenosis—initially regurgitation of feeds in first week, vomiting in 2nd or 3rd week, constipation from birth, loss of weight. (viii) Stomach torsion. (ix) Diaphragmatic hernia. (x) Lactobezoar—obstruction from 5-14 days. (xi) Hirschprung's disease. (xii) Paralytic ileus—Peritonitis, sepsis, hypokalemia.

2. *Reflex causes*—(a) Stimuli from GI tract—(i) Mucus gastritis—swallowing of amniotic fluid could be cause of unexplained vomiting in first 2-3 days. (ii) Gastritis from acute parenteral infection, severe respiratory infections, or bacterial gastroenteritis. (iii) Spontaneous gastric perforation (1st week). (iv) Peptic or duodenal ulcer. (v) Necrotising enterocolitis of new born. (vi) Hemorrhagic disease of new born. (b) Stimuli from urinary tract—(i) Urinary tract infection in new born. (ii) Uremia. (iii) Inborn errors of metabolism—Aminoacid disturbances like PKU, fructose intolerance.

3. *Central causes*—(i) Cerebral oedema—birth injury, asphyxia. (ii) Intracranial haemorrhage. (iii) Sepsis and neonatal meningitis.

*Eruption fever*—As the rash reaches the vesicular stage the prodromal fever falls to normal, but within a day or two as the rash becomes pustular the temperature again rises. The degree of fever and severity of symptoms are proportional to the profuseness of the rash.

STAGE OF DESSICATION—about the 10th day pustules commence to rupture and pus exudes; subsequently they dry rapidly. Temperature falls gradually. Scabbing continues during third or fourth week.

**Clinical types:**

1. *Variola major*—according to profusion of rash on face—(a) Confluent—pocks coalesce. Severe type. (b) Semiconfluent. (c) Discrete—pocks remain separate from each other.
2. *Hemorrhagic* (*Hypertoxic*)—(a) *Fulminating hemorrhagic smallpox*—is the most virulent type. Fever, severe malaise and hemorrhages into the skin, bleeding from mucous membranes and shock. Invariably fatal. (b) *Flat or malignant smallpox*—Highly virulent form. Prodromal illness followed by patchy or diffuse erythema, hot and tender resembling acute sunburn The rash progresses to flat velvety lesions which do not mature into vesicles but gradually fissure and desquamate. Most lesions show hemorrhages into their bases and may have an erythematous areola Bleeding may occur from the mucosae. The disease is usually fatal in 8-10 days.
3. *Abortive type*—In persons who have been vaccinated shortly before exposure to smallpox, macules and papules involute with great rapidity, or there may be no eruption at all and there is only mild febrile illness.
4. *Modified smallpox* (Varioloid)—due to previous inoculation—(a) *Almost complete protection* (variola sine eruptione)—Mild pyrexial illness lasting 3-4 days without rash. (b) *Partial protection*—Appearance of sparse rash which matures rapidly and crusts within a week (c) *Slight protection*—Clinical illness similar to ordinary smallpox except for more rapid maturation of the rash. (d) *Highly immune contacts*—Febrile illness with cough and perhaps wheezing. X-ray chest reveals transient diffuse infiltrations The illness is thought to be an allergic reaction to variola virus (smallpox handler's lung).

2. Small feeds of suitable concentration Thickening of feeds with cereal in pyloric stenosis.
3. Relief of pylorospasm—with atropine methonitrate 0 5-1.0 mg. 20 minutes before feeds.
4. Nursing in propped up position in chalasia.
5. Management of dehydration. In pyloric stenosis, hypochloremic acidosis needs treatment with 1/3 glucose saline and potassium in concentration of upto 40 mEq/1.
6. Surgery—for specific causes. In pyloric stenosis Ramstedt's pyloroplasty.
7. Antibiotics—for suspected sepsis or ileus.

## 6. HYALINE MEMBRANE DISEASE AND RESPIRATORY DISTRESS IN THE NEWBORN

**Predisposing factors**—It is one of the major causes of death in the newborn period. Incidence inversely proportional to gestational age and weight. Common in prematures, infants of diabetic mothers delivered before term, Caeserian section, asphyxia, precipitous delivery after antepartum hemorrhage.

**Etiology:** (1) Defective surfactant in alveolar lining. Defective surfactant aggravated by high oxygen concentration, poor airway drainage, asphyxia, hypoxia, hypovolemia leading to pulmonary ischemia and cold stress. (2) Small alveoli which inflate with difficulty and tend to collapse on expiration. (3) Weak and compliant chest wall.

PATHOPHYSIOLOGY: Surfactant (dipalmityl phosphatidyl choline) deficiency leads to collapse owing to increased surface tension, so there is a failure to maintain functional residual capacity. Surfactant synthesis by Type II alveolar cells increases with foetal maturity. Diameters of airways upto bronchioles are smaller in prematures, requiring greater force for inflation and larger trans-pulmonary pressure to keep them from deflating. Also highly compliant chest wall at this time compounds tendency to atelactasis, offering poor resistance. These factors produce near-atelactasis, dyspnoea and tachypnoea, increased airway resistance and work of breathing, and eventually hypoxia, hyperpnia and acidosis. These events cause pulmonary vasoconstriction, maintenance of ductal blood flow and foramen ovale flow in an attempt to perfuse the lungs Decreased lung flow causes ischemic necrosis of surfactant cells and the vasculature causing effusion of protein-like material into alveolar spaces, producing the hyaline membrane.

weak dettol baths, or wet dressings, loosening of crusts in nose with swabs moistened in oil.

2. *Diet*—Fluid diet consisting largely of milk and glucose drinks.
3. *Symptomatic*—(i) Shock and dehydration—Plasma, glucose saline, corticosteroids (ii) Hemorrhages—Blood transfusion. (iii) Headache and delirium—Sedatives.
4. *Antibiotics*—Penicillin, ampicillin, erythromycin or tetracycline reduce toxemia, prevent secondary fever, hasten period of scab formation, and lessen the chances of pitting or deformation and of septic complications, pulmonary infection and corneal ulcers.
5. *Antiviral drugs*—(a) *Methisazone* (Marboran)—a synthetic antiviral agent may decrease mortality in severe cases. Dose 1.5 to 3 g. b.d. by mouth for 4 days, materially decreases incidence of smallpox after known intimate exposure regardless of vaccination status. (b) *Hyperimmune antivaccinia gamma globulin*—useful in prevention or modification of smallpox in persons known to have been exposed if it is given in the incubation period or in the pre-eruptive phase of the disease.
6. *Corticosteroids*—may be used in severe or potentially fatal form of the disease, e.g., hemorrhagic smallpox.

IMMUNISATION—Smallpox is totally eradicated and there is no need for vaccination in any area.

## 9. SCARLET FEVER

*Causative agent*—Streptococcus pyogenes (Group A) producing erythrogenic toxin.

*Incubation period*—1-5 days.

*Mode of transmission*—Direct contact or droplet infection.

**Clinical features:**

STAGE OF INVASION—Sudden onset with sore throat, fever, headache and general malaise. This stage lasts for 1-3 days. In mild case no symptoms of invasion except sore throat.

STAGE OF ERUPTION—

*Rash*—(i) *Onset and distribution*—Rash commences on second day on neck and upper part of chest and quickly spreads over body and limbs, fading out gradually below the elbows and knees In a mild case it may be limited to the trunk but in severe cases it is distinct even on palms and soles. (ii) *Character*

cular granularity of lung fields with air bronchogram seen within 6-12 hours characteristic but not pathognomonic.

**Other causes of neonatal respiratory distress:**

(a) *Respiratory causes*—1. Prenatal, natal meconium aspiration. 2. Intrauterine or postnatal pneumonia. 3. Pneumothorax, pneumomediastinum. 4. Pulmonary hemorrhage. 5. Transient tachypnia of the full-term newborn (persistence of lung fluid, recovers fully). 6. Wilson-Mikity syndrome (late onset dyspnoea, X-ray shows 'bubbly' lungs, cause unknown). 7. Congenital malformations—Chonal atresia, Pierre Robin syndrome (small chin, cleft palate, tendency for tongue to fall back); laryngeal webs, stenosis, atresia, vascular rings, ectopic goitre, T-O fistula, congenital lobar emphysema, pulmonary agenesis, diaphragmatic hernia, cogenital tumors, e.g. cysts, teratomas.

(b) *Cardiovascular*—CCF from any cause, congenital heart disease, severe anemia, polycythemia, diabetic offspring.

(c) *Neurological*—Birth asphyxia or injury, intracranial hemorrhage, plexus injuries in breach deliveries.

(d) *Metabolic*—Acidosis, uraemia, inborn errors of metabolism.

**Treatment:** Course can be altered by intensive care and supportive therapy.

1. *Treatment of inadequate gas exchange*—Oxygen to keep arterial blood levels between 50 and 70 mm Hg with stable vital signs, while minimising risks of toxicity. Inspired concentration safely kept at 40-70%. If $>$ 50 mm Hg $O_2$ cannot be achieved, use of continuous positive airway pressure (CPAP) by nasal prongs or head box is used. Persistent apnoea, blood pH $<$ 7.2, $pCO_2$ $>$ 60 mm Hg, $pO_2$ $<$ 50 mm Hg at $O_2$ concentrations of 70-100% need assisted ventilation (mask and bag resuscitator or variable pressure respirator with endotracheal tube). This may also help in correction of respiratory acidosis.

2 *Correction of metabolic acidosis*—Sodium bicarbonate 7.5% solution 2ml/kg slowly IV diluted in 5 times volume of 5% glucose (1 ml $NaHCO_3$ = 0.9 mEq Na). Formula—$HCO_3$ (mEq) needed = Deficit of $HCO_3 \times 0.6 \times$ body weight (kg). One half of calculated amount given initially. More than 12mEq/kg/day can aggravate hypernatremia and CCF. Alternately THAM 1 ml/kg for each pH unit below 7.4 at rate of 1 ml/min.

3. *Pharmacological closure of ductus*—If ductus complicates the disease, oral or rectal indomethacin 0.1 mg/kg given thrice at 6-8 hour intervals. The drug inhibits prostaglandin synthesis. Surgical closure may be necessary.

## 10. MUMPS (EPIDEMIC PAROTITIS)

**Etiology:** *Age*—Majority in children under 15. *Causative agent*—Paramyxoma virus. *Portal of entry*—Upper respiratory tract; it spreads through blood stream and has tendency to multiply in glandular structures. Spreads from human reservoir by direct contact, airborne droplet nuclei, or fomites contaminated by infected saliva.

*Incubation period*—16-21 days.

**Clinical Features:**

*Onset*—(i) Moderate fever, sore throat, drawing or puckering feeling at angle of jaw. (ii) Swelling of face may be the first to draw attention (iii) Onset with rigor or convulsion. (iv) With meningeal reaction—"cerebral mumps".

*Early signs*—(i) Pain or tenderness on pressure beneath angle of lower jaw. (ii) Reddening of papilla of Stensen's duct.

*Parotid glands*—usually one gland affected followed by the other after a varying interval; or only one gland affected throughout; or simultaneous enlargement of both The swelling reaches its maximum in about 3 days, remains at its peak for about 2 days and then slowly recedes. The lobe of the ear is in the centre of the swelling which is tender on pressure. The skin over it may be normal or slightly red and shiny.

*Other salivary glands*—Submaxillary gland usually enlarged simultaneously with the parotid, or later. Less frequently enlargement of sublingual glands In severe mumps a horse-shoe shaped mass may distend the neck from ear to ear.

*Fever*—may rise to 103°-104° F after appearance of parotitis; remittent or intermittent, falls by lysis in 3-7 days.

*Other symptoms*—Diminished salivation, furred tongue and foul breath. Marked enlargement of parotid may cause trismus and deafness.

**Complications:**

A COMMON—

1 *Orchitis and epididymitis*—usually unilateral Common in young adults, may occur without parotitis. Fever returns and may go upto 105° F. Testis swollen, tender and tense with or without epididymitis. At the height of the attack delirium or stupor may occur. Lasts for about 10 days; may result in sterility.
2. *Meningitis*—Usually follows parotitis but may occur at the same time or even before salivary gland enlargement.

Grade 0 for each criterion indicates no distress.

Grade 2 for each criterion indicates severe distress. Applicable 1-2 hours after birth.

## 7. INFECTIONS OF THE NEWBORN

**Etiology and pathogenesis:**

1. PRENATAL (transplacental infections)—(a) *Viral*—cytomegalic, rubella, varicella, vaccinia; hepatitis B, coxsackie, influenza. (b) *Bacterial*—E. coli, listeria, M tuberculosis. (c) *Spirochaetal*—Treponema pallidum. (d) *Protozoal*—Toxoplasma gondii, malaria. Transplacental infection can cause embryonal disintegration, abortion, stillbirth, congenital malformation, intrauterine growth retardation, prematurity, acute neonatal disease, asymptomatic but persistent disease with late neurosequelae.

2. INTRANATAL INFECTIONS—(a) *Viral*—herpes simplex type 2, viral hepatitis, coxsackie, cytomegalus. (b) *Bacterial*—Group B streptococcus, Gram negative bacilli (E. coli, klebsiella, proteus, enterobacter, pseudomonas causing septicemia); gonococcal (causing ophthalmia neonatorum). (c) *Fungal*—Candida (thrush). (d) *Chlamydial*—Chlamydia trachomatis (inclusion conjunctivitis). These infections are apparent within hours of birth. Acquired through aspiration of infected liquor, foul vaginal secretions or maternal genital infection.

3. POST-NATAL INFECTIONS—(a) *Viral*—Coxsackie, respiratory syncitial virus. (b) *Bacterial*—staphylococci, streptococci, clostridium tetani, Gram negative organisms. Nasocomial infections (hospital acquired) important in this group as is community exposure. Primary routes—Respiratory tract, GI tract, umbilicus, IV sites, surgical wounds, endotracheal intubation.

**Predisposing factors**—A. *Maternal*—1. Susceptibility to rubella, CMV of non-immune, or non-immunised. 2. Sexual promiscuity—excess vaginal colonization, venereal disease. 3. Premature rupture of membranes—ascending infection of amniotic fluid 4. Urinary tract infection. 5. Nonspecific genital colonization—innocuous for mother, pathogenic to infant. 6. Obstetric difficulties and trauma. 7. Birth asphyxia and meconium aspiration in a "distressed" foetus.

2 *Neonatal*—1. Prematurity—three-fold higher incidence. 2. Male infants—two-fold incidence. 3. Resuscitation at birth

6. *Nutritional*—Bilateral parotid swelling due to malnutrition or in alcoholic cirrhosis.
7. *Sarcoidosis*—Subacute bilateral parotitis with often evidence of uveal tract involvement.
8. *Parotid tumours*—usually unilateral, no fever.
9. *Mikulicz's disease*—Bilateral chronic painless enlargement of parotid, and other salivary glands and lacrymal gland.
10. *Uveo-parotid tuberculosis*—Bilateral swelling of parotid glands with inflammation of uveal tract. Lymph glands may be enlarged and spleen palpable Gland firm, painless and often nodular. No reddening of orifice of Stensen's duct.

**Management:**

1. *Rest in bed*—for about 10 days.
2. *Diet*—Liquids, or semisolids depending on patient's ability to chew.
3. *Oral hygiene*—Mouth wash with Glyc. Thymol Co. or 1 in 5,000 potassium permanganate solution.
4. *Analgesics*—Aspirin or paracetamol for pain and fever.
5. *Management of orchitis*—Complete bed rest, ice compress to scrotum, sling support for testicle. Corticosteroids if swelling very severe—Prednisolone 15 mg. q.d.s. for 4 days and then gradually reduced or ACTH single IM dose of 100 IU. If pain severe incision of tunica vaginalis or injection of spermatic cord at the external inguinal ring with 10-20 ml. of 1% procaine solution.

PREVENTION—1 ml. of formalin inactivated egg-grown mumps virus intradermally. Local erythema and induration after 24-48 hours denotes positive reaction. Negative test denotes susceptibility and 2 doses of 1 ml each of the vaccine may be injected at 5 to 7 days interval. Immunity lasts from 6 months to 1 year. Immunoglobulin for passive immunity ineffective.

## 11. POLIOMYELITIS

**Epidemiology:** Polio is a systemic infectious disease caused by polioviruses. *Age*—Majority under 5 years; rare before age of 6 months During epidemics older children and adults also. *Sex*—Males slightly more affected. *Climate*—In developed countries epidemics occur in late summer or early autumn. In tropical climates infection spreads throughout the year, with an apparent relationship to temperature, rainfall or other climatic conditions. *Known contributive factors*—include pregnancy, tonsillectomy (bulbar type), excessive exertion and fatigue. Recent immunization may be followed by provocation poliomyelitis in the injected limb. *Mode of transmission*—The virus is spread by droplet infection and faecal contami-

**Treatment:** depends on specific type of infection. (See below.)

PREVENTION: 1. Good antenatal care. 2. Safe delivery. 3. Prompt treatment of meconium aspiration. 4. Care of cord—Application of spirit or triple dye daily. 5. Breast feeding. 6. Clean surroundings, care on part of personnel, rigorous hand washing eliminates major part of risk. 7. Regular fumigation of nursery, cultures of surroundings and equipment 8. Rubella vaccine in pregnant mothers.

**Specific infections**

*Congenital rubella*—Abortion, low birth weight, hepatosplenomegaly, petechiae, osteomyelitis, congenital heart disease (PDA, VSD); microcephaly, cataracts, microphthalmia, deafness, mental retardation, degenerative brain disease, diabetes. Isolation of infant necessary as it can infect pregnant women well beyond neonatal period.

*Cytomegalus*—Hepatos plenomegaly, anemia, thrombocytopenia, encephalitis, microcephaly, microphthalmia, chorioretinitis, deafness, mental retardation, cerebral calcification.

*Herpes simplex*—Disseminated sepsis encephalitis, microcephaly, retinopathy, cerebral calcification.

*Toxoplasmosis*—Low birth weight, hepatosplenomegaly, jaundice, anemia, microcephaly or hydrocephalus, mental retardation, chrioretinitis.

**Sepsis and Meningitis**

COMMON ORGANISMS—E. coli, group B streptococcus, staph, aureus.

*Early onset disease*—Fulminant septicemia in first week.

*Late onset disease*—as meningitis after first week

SYMPTOMS AND SIGNS: of septicemia and convulsions. Bulging and fontanelle and neck stiffness may be absent in 75% of cases. Initially may not 'do well' or just 'feel poorly'.

DIAGNOSIS: CSF examination and culture Other site cultures and blood culture may help. Normal CSF protein as high as 45-1000 mg/dl in term baby and upto 300 mg/dl in preterm Upto 70 polymorphs/cmm normal in newborn and upto 25 in first 7 days. Upto 800 RBCs/cmm normal in newborn and upto 50 in first 7 days. CSF sugar < 50% of blood sugar diagnostic of meningitis.

COMPLICATIONS: Ventriculitis, status epilepticus, neural deficits, deafness, hydrocephalus, blindness, abnormal speech and learning problems later.

(i) Reflexes—Superficial and deep reflexes—in early stages active and remain so unless paralysis supervenes.

(j) C.S F—Clear or ground glass. Pressure increased. Protein—normal at first, rises to 100-200 mg. per 100 ml. during second week. Sugar normal. Cells 50-100, mostly polymorphs at first, later lymphocytes. Rarely fluid may be normal.

*Signs* .

(a) Pulse fast and out of proportion to rise of temperature.
(b) Excessive perspiration.
(c) Patient is alert.

3. PARALYTIC STAGE—usually develops between 2nd and 5th days after onset of signs of involvement of nervous system. May set in without initial symptoms. Characteristics are—(i) Usually appears while there is still fever. (ii) Maximum at onset. (iii) Distribution often asymmetrical. (iv) Paralysis usually begins within one to five days after onset of illness, progresses for 1 to 3 days, remains stationary for about a week and then shows improvement which is rapid for some weeks and then becomes slower. (v) Absence of sensory loss.

*Distribution of paralysis*—usually patchy, may produce monoplegia, paraplegia and quadriplegia. (i) Lower limbs—more frequently affected. Groups of muscles usually picked out are quadriceps, tibialis anterior and peroneal group. (ii) Upper limbs—most commonly deltoid. (iii) Trunk—abdominal muscles, muscles of back, intercostals or diaphragm. (iv) Respiratory disturbances—due to paralysis of diaphragm and intercostal muscles, or affection of respiratory centre in bulbar type. Recognised by—anxiety, increasing weakness of voice, cough, sucking in of epigastric or intercostal spaces with increasing use of accessory muscles of respiration, diminution in the numbers a patient can count after one inspiration, and cyanosis.

4. CONVALESCENCE—Initial paralysis usually diminishes to some extent after a period of two or more weeks, and improvement may continue for several months. The affected muscles become flaccid whilst contraction will tend to produce severe deformities unless these are prevented. When the chronic stage is reached six months to a year after initial infection, no further spontaneous improvement can be expected.

**Necrotising enterocolitis—**

*Pathogenesis*—Common in premature newborns. Most important predisposing factors are prematurity, feeding of artificial milk and superimposed infection. Other factors are perinatal asphyxia, hypothermia, respiratory distress syndrome, congenital heart disease, ischemia of intestine due to shock states, during exchange transfusion or introduction of umbilical artery catheter, hypertonic milk formulas, immaturity of immune response of intestine.

The bowel becomes dilated, hemorrhagic and necrotic with submucosal gas formation, which may cause perforation. If infant survives, fibrosis and stenosis of that portion may occur.

*Clinical features*—Normal for first few days. Symptoms and signs include abdominal distension, large gastric aspirate, bloody diarrhoea followed by signs of sepsis, dehydration, acidosis, disseminated intravascular clotting, perforation.

*X-rays*—of abdomen may reveal gas in bowel wall (pneumatosis intestinalis), portal vein gas (an ominous sign), or gas under diaphragm if perforation has occurred.

*Treatment*—is supportive. Withhold oral feeds, correct dehydration, attempt IV feeding. Periodic stomach aspirations. Antibiotics are used for presumptive sepsis—oral kanamycin or gentamicin. Oral feeds reinstituted after 7 days, dilute at first preferably breast milk which supplies immune factors. Formation of a lump, or perforation may necessitate resection and anastomosis of affected bowel.

**Coxsackie virus infections and ECHO virus**

Mild febrile disease, rashes, aseptic meningitis, disseminated viraemia (CNS, liver, heart), gastroenteritis, In-utero infection can cause congenital heart disease and viral myocarditis in neonatal period.

**Umbilical infection (Omphalitis)**

*Causes*—Any pyogenic bacteremia commonly Staph. aureus. Danger of hematogenous spread or extension to liver and peritoneum. Foul smelling umbilical discharge or failure of cord to separate within normal period of time may provide a clue. General symptoms and signs might be minimal.

*Treatment*—Appropriate systemic antibiotics. Local application of spirit and neomycin ointment.

*Prevention*—Clean cord care. Thrice daily swabbing with spirit or application of triple dye. The cord is best left open, no restrictive binders are necessary.

occur late. C.S.F. clear or slightly turbid with upto 1000 cells per c.mm. usually lymphocytes.

2. *T.B. meningitis*—Insidious onset. Previous ill health. Slow respiration. Flaccid paralysis uncommon. Ocular palsies.
3. *Encephalitis*—

| | *Poliomyelitis* | *Encephalitis* |
|---|---|---|
| Age .. | Usually below 20 | Any age. |
| Onset .. | Acute or subacute | Insidious. |
| Fever ... | Higher at onset before paralysis | Often higher later. |
| Affection on nervous system ... | Paralysis of limbs common | Pupillary and ocular signs common. |
| Involuntary movements ... | Absent | Frequent. |
| Course ... | Brief | Prolonged. |

4. *Conditions with tenderness of limbs*—e.g. acute rheumatic fever and infection of bones, joints and muscles. No abnormal nervous signs. C.S.F. normal. No true paralysis.

PARALYTIC STAGE—

1. *Conditions causing pseudoparalysis*—
   (a) *Rickets*—enlarged epiphysis, beading of ribs, frontal bossing, diagnostic X-ray.
   (b) *Scurvy*—swelling of limbs with extreme tenderness. Swollen and bleeding gums.
   (c) *Syphilitic epiphysitis*—occurs early in life. Other signs of congenital syphilis. Positive VDRL test. X-ray changes.
   (d) *Acute osteomyelitis*—child may not move limb because of pain. Diagnosis by X-ray.
   (e) *Unrecognised trauma*—e.g. contusion, sprain, fracture.
2. *Conditions causing muscle weakness*—
   (a) *Acute infective polyneuritis*—Paralysis commences in legs and rapidly ascends. No hyperaesthesia, often anaesthesia. Bilateral facial palsy common. C.S.F.—proteins increased without increase of cells.
   (b) *Peripheral neuritis.*

**Management:**

1. *Preparalytic stage*—(i) *Rest in bed*—on a firm mattress with as little disturbance of patient as possible. A padded foot-board serves to protect the legs from pressure of bed-clothes

epiphysis. The condition is so painful that the infant may refuse to move the limb—"pseudo-paralysis". (ii) Periostitis along the shafts of the bones. (iii) Dactylitis occasional. (iv) Skull bones—hydrocephaly, cranio-tabes, Parrot's nodes.

**Diagnosis:**

1. *X-rays of long bones*—Perisotitis of shafts of long bones gives appearance of double margin or greatly thickened cortex. A characteristic symmetrical lesion is eroded areas (moth eaten appearance) at upper end and inner aspect of tibia. Classical sign of Wimberger—'cat-bite' deformity of medial tibial condyle. Widened and serrated epiphyseal lines, separation of epiphyses. Periostitis may persist despite therapy.

*Serology*—

2. VDRL test positive in mother. Higher titre of baby compared to mother or rising titre after 3 months diagnostic in baby. Also positive RPR and ART test.

**Late congenital syphilis**—

1. *Interstitial keratitis*—begins as a small pinkish grey patch near the margin of the cornea (salmon patch) which gradually spreads until the whole cornea is involved.
2. *Neurosyphilis*—Juvenile general paralysis more common than tabes, meningo-vascular syphilis, optic atrophy.
3. *Teeth*—(i) Hutchinson's teeth—the incisors of the second dentition are broader at the base than at the cutting edge, in the centre of which there are notches. (ii) Moon's molars—molars dome-shaped.
4. *Bones*—Sclerosing osteitis and periostitis—sabre tibia, gummata of bones which might break down and leave a discharging sinus. Necrosis of nasal bones and hard palate not uncommon.
5. *Joints*—Painless effusion into the synovial cavities, most commonly the knees (Clutton's joints). Rarely multiple arthritis of smaller joints resembling rheumatoid arthritis.
6. *Visceral changes*—Liver may enlarge upto the umbilicus, surface may be irregular. Ascites and jaundice rare. Splenomegaly. Kidneys—albuminuria, casts and hematuria due to progressive renal fibrosis. Recurrent attacks of paroxysmal hemoglobinuria may occur.
7. *Deafness.*

nancy: Hodgkin's disease, lymphoma, leukemia (c) Acute febrile illness. (d) Pregnancy, especially first 4 months. (e) Acute diarrhoea. (f) Allergy to penicillin, streptomycin, polymixin or neonycin.

*Passive immunization*—with 5-15 ml. according to age of child of gamma globulin. Some measure of protection is afforded for 6 weeks. Indications—New-born in hospital who are exposed to infection, unimmunised children in hospital ward in which a case of poliomyelitis develops, nurses and medical students who have not been immunised and who have come in contact with early cases of polio.

## 12. VIRAL ENCEPHALITIS & ENCEPHALOMYELITIS

**Definition**—Acute inflammation of the brain and spinal cord caused by viral infection. It may occur in a previously healthy person (acute disseminated encephalomyelitis) or can appear after a known virus infection (post-infectious encephalitis). The two groups have much in common both in clinical features and post-mortem pathology. Arboviruses are transmitted to men by bite of mosquito or tics.

**Etiology:**

1. *Acute disseminated encephalomyelitis*—may be associated with enteroviruses e.g. herpes simplex, echo, coxsackie, poliomyelitis and mumps, herpes zoster, infectious mononucleosis, influenza, varicella.
2. *Post-infection encephalomyelitis*—following most commonly measles and vaccination, but also chickenpox, rubella, mumps and influenza.

**Clinical Features**—of encephalitis vary from case to case, from epidemic to epidemic and from one specific type of infection to another. One of the most common symptoms is a mild confusional state associated with signs of a febrile illness.

1. *Onset*—(a) *Insidious*—with prodromal symptoms. There may be evidence of primary infection e.g. with poliomyelitis there may be history of mild gastro-intestinal upset followed by fever and general malaise. Encephalomyelitis associated with childhood fevers tends to develop usually about 5-10 days after appearance of rash. (b) *Sudden*—with fit, vertigo or headache.
2. *Constitutional symptoms*—vary from mild indisposition to profound toxic state. Fever may vary from just above normal to hyperpyrexic levels and above. General aches and pains, headache and vomiting common.

4. There is higher concentration of iron, and hence iron deficiency anemia commonly found in artificially fed children does not develop.
5. Development of respiratory and gastrointestinal allergies are less common if the infant is fed on breast milk alone upto 3 months of age.
6. Psychological advantage for both mother and child.
7. Cheap.
8. Lactation amenorrhoea—this helps family planning.

*Disadvantages and contraindications*—Infrequently allergens to which the infant is sensitised may be conveyed in the milk. Contraindications—Temporary—Fissuring or cracking of nipples, mastitis, acute illness in mother. Permanent—Septicemia, nephritis, profuse hemorrhage, typhoid fever, chronic poor nutrition, debility, epilepsy, severe neurosis or postpartum psychosis, severe diabetes, mother receiving drugs such as antithyroid drugs which are secreted in milk.

SUPPLEMENTARY FEEDINGS—should be offered after 3 months of age. May have to be given earlier if breast milk is not sufficient.

WEANING—Usually advisable when infant is 6-9 months old. Initially one of the breast feeds is replaced by bottle-feeding. After several days another breast feed is replaced and so on until the baby is entirely weaned. The total time required depends on the maternal milk supply.

**Artificial feeding:**

1. *Whole fresh milk*—buffalo, cow, goat Dilution—1 : 1 upto 1 month, 2 : 1 upto 2 months, undiluted later Composition —in g./100 ml is shown in the table.

| *Milk* | *Human* | *Cow* | *Buffalo* | *Skimmed* | *Toned* |
|---|---|---|---|---|---|
| Protein ... | 1.5 | 3.5 | 4 | 4 | 4 |
| Fat ... | 4 | 4 | 7 | — | 2 |
| Carbohydrate . | 7 | 4 | 4 | 4 | 4 |
| Calories ... | 20 | 20 | 40 | 13 | 15 |

2. Skimmed milk }
3. Toned milk } Low fat content is preferable for fat intolerance.

5. *Involuntary movements*—(a) Choreiform movements occasional. (b) Bradykinesias—Slow, regular, rhythmical movements of large amplitude involving limbs, or limbs and trunk. (c) Other involuntary movements—Myoclonic movements, tremor, tics and torticollis.
6. *Respiratory disturbances*—of rate and rhythm and respiratory tics.
7. *Hemiparesis.*
8. *Metabolic and endocrine disorders*—Obesity, polyuria.
9. *Epileptiform convulsions.*
10. *Deafness and vestibular damage.*

**Management:**

1. *Nursing care*—with avoidance of decubitus skin lesions. Padded side rails to prevent injury during convulsions. Turn patient from side to side every 2 hours to prevent hypostatic pneumonia.
2. *Fluids and nourishment*—should be adequate, IV drips.
3. *Sedatives*—if hyperexcitability or tendency to convulsions. Diazepam 10 mg or 120 mg. sodium phenobarbitone initially and then 30 to 60 mg. at intervals sufficient to reduce frequency of seizures. A dose of 100 mg dilantin sodium can be given IM or IV every 6 hours at the same time.
4. *Maintenance of airway*—Insert oropharyngeal airway and apply naso-tracheal suction at frequent intervals. If this fails to keep the airway clear, an endotracheal tube must be inserted or tracheotomy performed.
5. *Care of limbs, skin, eyes, bladder and rectum*
6. *Corticosteroids*—should be used when signs suggestive of cerebral oedema rapidly develop. (Contraindicated in varicella encephalitis) Dexamethasone 4 mg. IM 6-hourly for 3 days to adult and 0.3 mg /kg. 24 hours for child. Corticotrophin better for encephalomyelitis, 40 units b.d. by IV drip for adult.
7. *Antibiotics*—if spinal fluid shows more than 300 leucocytes (not lymphocytes) per c.mm., to protect the patient against possibility of bacterial meningitis—Penicillin in large doses together with streptomycin and chloramphenicol.
8. *Management of hyperthermia*—Cover patient with a sheet soaked with cold water and fans blowing over them. A tap water enema (temp. 70° F) may also help.
9. *Management of hyperventilation*—If there is both hyperpnoea and tachypnoea, patient should be given 95% $O_2$ and 5% $CO_2$ until hyperventilation subsides.

## 10. FAILURE TO THRIVE

*Definition*: Failure to gain and often loss of weight in infants (and children) in absence of apparent cause.

**Causes:**

**I Inadequate intake—**

A. *Environmental causes* (1)—Inadequate food intake due to ignorance and poverty. (2) Emotional deprivation including maternal deprivation. (3) Environmental disruptions. (4) Rumination (controlled regurgitation of feeds). (5) Child abuse, withholding of food. (5) Psychiatric causes—infantile autism, childhood schizophrenia, anorexia nervosa in adolescence.

B. *Organic causes*—(1) Inability to suck due to prematurity, birth trauma, congenital malformations such as cleft palate and upper GI obstructions. (2) Chronic vomiting.

**II. Lack of digestion—**

(1) Chronic iron deficiency anemia. (2) Lack of bile in biliary atresia. (3) Pancreatic insufficiency in cystic fibrosis. (4) Chronic active hepatitis.

**III. Impaired absorption—**

(1) Chronic diarrhoea. (2) Chronic infestation e.g. giardia. (3) Intestinal malabsorption syndromes—congenital disaccharide deficiency, cystic fibrosis, coeliac disease. (4) Structural intestinal defects.

**IV. Impaired utilisation—**

(1) Chronic infections—Tuberculosis. (2) Endocrine disorders—hypothyroidism, hyperthyroidism, hypoadrenalism, growth hormone deficiency, diabetes insipidus. (3) Chronic renal failure. (4) Congenital heart disease especially cyanotic. (5) Malignancy. (6) Chronic hemolytic anemia such as thalassemia. (7) Inborn errors of aminoacid and carbohydrate metabolism.

**V. Hereditary—**

(1) Chromosomal disorders—Down syndrome, Turner syndrome. (2) Primordial dwarfism. (3) Syndromes with premature ageing—progeria. (4) Cerebral malformation, cerebral degeneration.

**Clinical picture:**

1. Failure to gain weight.
2. Failure to grow at expected rate.
3. Signs of developmental retardation.

(c) *Stage of glandular enlargement*—may begin in 3rd week. Glands moderately tender. Temperature rises, remittent for few days and gradual fall. Spleen usually palpable, enlarged glands may cause abdominal disturbances. Thoracic and mediastinal glands may also cause pressure symptoms. Periorbital oedema.

2. ANGINOSE TYPE—Pharyngeal inflammation or exudate. Membrane may persist for days and oedema may develop. Gums may become swollen, tender, ulcerated, and bleed.
3. FEBRILE TYPE—Abrupt onset with sore throat; prolonged pyrexia first remittent then intermittent; marked constitutional disturbances; late occurrence of glandular enlargement, splenomegaly rare; macular or papular rash chiefly on trunk.
4. ICTERIC FORM—Jaundice due to parenchymatous hepatitis may occur in 5 to 10 per cent of patients—(a) with the glandular enlargement, (b) as the first symptom followed by other features, (c) as the only symptom with slight or no fever. Raised SGPT levels.
5. NERVOUS FORMS—(a) Meningeal form. (b) Encephalitic type. (c) Peripheral neuritic form. (d) Ocular with papilloedema and bilateral iridocyclitis.

**Laboratory diagnosis:**

1. *Leucocyte count and blood film*—generally elevated with absolute and relative lymphocytosis and presence of numerous atypical lymphocytes (affecting 20% or more of peripheral lymphocytes).
2. *Paul-Bunnell test*—The serum contains characteristic heterophile antibody. This antibody, which is present during the acute illness and in convalescence, agglutinates erythrocytes of other species such as those from sheep and horses It is differentiated from other similar antibodies by absorption of the patient's serum with appropriate antigens; to be diagnostic of IM the titre after guineapig kidney absorption must be greater than the titre after absorption with ox cells Alternatively, the serum should give a positive result in a slide test (Monospot test) which employs similar absorptions.

**Differential Diagnosis:**

A. DISEASES WITH SIMILAR CLINICAL ONSET—

1. *Acute infections*—Prodromal stage of influenza or upper respiratory tract infection. Typhoid fever and subacute bacterial endocarditis may simulate because of palpable spleen.

## 11. MARASMUS

(INFANTILE WASTING OR FAILURE TO THRIVE. PROTEIN AND CALORIC MALNUTRITION.)

**Causes:**

1. *Insufficiency of diet*—(i) Incorrect preparation, unsuitable feeding habits, disturbed mother-child relationship, poverty. (ii) Inability to take food properly—(a) Local lesions of mouth and jaw—cleft palate, hare lip, micrognathia, thrush, chronic nasal obstruction. (b) Upper gastro-intestinal tract disease—pyloric stenosis, oesophageal stricture, hiatus hernia. (c) Neurological—muscular weakness due to anterior spinal muscular atrophy, congenital hypotonia, facial palsy, brain damage due to birth injury or kernicterus, congenital developmental anomalies, persistent respiratory infection.
2. *Lack of digestion*—(a) Achlorhydria due to chronic infection. (b) Diminished pancreatic juice—mucoviscidosis. (c) Absence of bile—obstructive jaundice, infective hepatitis, biliary atresia. (d) Any other infection causing diminished secretion of all intestinal juices. (e) Malnutrition itself suppresses some enzymes
3. *Impaired absorption*—Low grade bowel infection including giardiasis; milk allergy, lactose intolerance, coeliac disease, fibrocystic disease, congenital dilatation of colon, biliary fistula and any disease that causes prolonged diarrhoea and/or vomiting.
4. *Absorbed but cannot be metabolized satisfactorily*—Localised infection, hepatitis, urinary infection. Generalised disease such as tuberculosis, chronic infection. Metabolic disorder—diabetes, hypothyroidism, galactosemia, glycogen storage disease.
5. *Metabolized but not properly utilized*—Children of low birth weight born at term, brain tumor, mental retardation, chronic renal disease, chromosomal abnormalities.

**Clinical picture:**

1. Progressive loss of subcutaneous fat—The child loses fat from axilla and the inside of the thighs, buttocks and abdomen and chest, and last of all from face and cheeks. When fat is put on again, it is in the reverse order.
2. Child is irritable and cries excessively.
3. Sharp features with typical appearance of withered old man (monkey facies).

**Management**—is mainly symptomatic. Initial period of bed rest for 2-3 weeks Gargles with soluble aspirin helpful for relieving sore throat. Antibiotics such as phenoxymethylpenicillin or erythromycin only if secondary infection. Ampicillin should be avoided as it produces a rash. Corticosteroids if severe pharyngitis, airway obstruction, severe thrombocytopenic purpura or acute hemolytic anaemia, and polyneuritis.

## 14. TETANUS

**Definition:** Tetanus is caused by a powerful neurotoxin (tetanospasmin) produced by strains of Clostridium tetani when introduced into the tissues. The disease is characterised by muscular rigidity and spasms.

**Pathogenesis:** *Infection*—Spores of C. tetani occur in faeces of herbivorous animals and men. Any kind of damage to skin or mucous membranes may admit spores to underlying tissue. C. tetani spores can germinate and the bacteria are lysed in the wound and release tetanus toxin.

*Predisposing factors*—Wounds most likely to engender tetanus are those for which treatment is delayed more than about 6 hours, those which are deep or contaminated with soil, metal, wood, calcium salts or bacteria; and those complicated by vascular damage causing necrosis of muscle.

*Routes of infection*—1. Punctured or war wounds. 2. Otitis media 3. Injections especially IM injections of quinine, or by narcotic addicts. Also vaccination. 4. Unsterile surgery including use of infected cat gut and swabs, criminal abortions, ritual circumcision, and ear-piercing. 5. Bowel surgery. 6. Burns. 7. Animal bites and stings. 8. Firework injuries 9. Intra-uterine death 10. Unsterile division of umbilical cord. 11. Compound fractures 12. Miscellaneous—Chronic skin ulcers, plaster sores, gangrenous limbs, eye infections, human bites, dental extractions.

*Incubation period*: usually 6 to 10 days, rarely several months.

**Clinical features:** of generalised tetanus

PRODROMAL SYMPTOMS—Nonspecific such as malaise, fever, sweating, headache and irritability.

PRESENTING SYMPTOMS—Trismus (lock jaw) and dysphagia (often described as sore throat) due to painful rigidity of masseters and muscles of deglutition Pain and stiffness in the neck and back.

SYMPTOMS OF ESTABLISHED DISEASE—(a) *Rigidity*—Rigidity affects the erector spinae and abdominal muscles producing ex-

worm. (c) Surgical correction of defects such as cleft palate. (d) Stimulation of appetite with cyprohepatadine hydrochloride and aiding digestion with enzyme preparations.

## 12. KWASHIORKOR

**Definition**—Kwashiorkor (severe or malignant protein malnutrition)—means literally "the neglected one" and describes the young child (usually between 6 months to 2 years) displaced from the mother's breast by the succeeding infant. The clinical syndrome is recognised in many tropical and sub-tropical areas where the staple diet is deficient in first-class protein.

**Clinical features:**

*History*—Usual history is that after a few weeks of some dietary change (weaning, separation from mother or a period of economic stress) the child was noticed to be less lively and not eating well. Then some respiratory infection or attack of measles, diarrhoea or fever leads to a great reduction in food intake and the child becomes manifestly ill. Other cases have no preceding infection or fever.

*Loss of weight and height*—Underweight in spite of much oedema. Shorter than normal children of same age.

*General appearance*—Oedema often generalised. Extremities often cold, hands and feet may be dusky purple. Child appears apathetic but resents attention ("leave me alone attitude") such as when food is offered. Eyes red, nose moist, mouth dribbling. Cheeks appear baggy because of oedema of buccal pad or fat.

*Oedema*—First appears on feet and face and often spreads to involve all parts of body. Ascites rare. In some cases slight oedema.

*Skin*—Characteristic dermatoses—erythema which soon changes into pigmented patches mainly in areas where the skin is subjected to continuous pressure. These patches soon desquamate to reveal pale underlying areas. The peeling plaques of dermatosis have been compared to cracked peeling areas of paint ("flaking paint" dermatosis). Occasionally desquamation is deep enough and resembles a burn involving limbs and abdomen and back, face very rarely affected. Petechial hemorrhages terminal

*Hair*—Discolouration and brittleness of hair. Much of the hair can be pulled out easily. During better periods of nutrition the scalp hair may grow more normally, but a fresh band of abnormal hair will appear during another period of malnutrition (flag sign).

4. *Splanchnic tetanus*—may follow abdominal or thoracic wounds or be post-operative. Spasms limited to muscles of deglutition and respiration.
5. *Tetanus neonatorum*—dye to sepsis of the umbilical stump Typically the weekold infant presents with inability to suck because of spasm of facial and pharyngeal muscles, or with generalised convulsions. Crying is hoarse and the face screwed up, with tightly closed eyes and wrinkled forehead. The arms are flexed and crossed with tightly clenched fists and the toes flexed. The back is very rigid.

**Differential Diagnosis :**

1. *Other causes of trismus*—(a) Irritant local lesions of teeth (dental abscess, pericoronitis), throat (peritonsillar abscess), temporomandibular joint, masseter muscle and cervical lymph nodes (b) Occasionally trismus occurs in postvaccinial and postinfectious encephalitis, serum sickness and even poliomyelitis. It is commonly observed in patients envenomed by sea snakes.
2. *Meningitis*—Neck rigidity can occur in both tetanus and meningitis. Signs of meningeal irritation and diagnostic CSF.
3. *Rabies*—Dysphagia associated with spasms of inspiratory and pharyngeal muscles also occurs in rabies. No trismus. Relaxation of muscles inbetween paroxysms.
4. *Tetany*—Spasms start in periphery with carpopedal spasm Usually associated with overbreathing or thyroid surgery.
5. *Other causes of muscle spasms*—e.g., dystonic reactions to drugs such as phenothiazines and metoclopramide. Grimacing, spasmodic neck retraction and torticollis, orbicularis spasm and oculogyric crises—the mouth is usually opened forcefully. Rarely strychninie poisoning. Muscle tone returns to normal between spasms.
6. *Acute peritonitis*—may be simulated because of abdominal rigidity.
7. *Hysterical*—Trismus without generalised rigidity; or hysterical opisthotonos which develops suddenly without preexisting rigidity.
8 *Catatonic schizophrenia*—might cause confusion in absence of background information.

CLINICAL COURSE: Most deaths occur by tenth day. Spasms usually subside by end of second or third week, but residual muscle stiffness may persist for more than a month.

put on weight rickets is likely to develop. Atrophic rickets may develop in malnourished children.

**Clinical features:**

1. *Head*—apparently larger than normal in horizontal diameters, forehead prominent (frontal bosses) and occiput and vault flattened out, hot-cross bun appearance, anterior fontanelle larger than normal and closing delayed, posterior portion of the skull, in the first year, may show thin, soft membranous spots (cranio-tabes). Frequent rocking movements of the head common, face appears small upper jaw being narrow, temporary teeth usually appear late.

2. *Thorax*—Beading of ribs at the junction of ribs with costal cartilages, best developed in the 4th, 5th and 6th ribs just external to the nipple—rickety rosary. Sternum unduly prominent producing a "pigeon breast". Horizontal depression corresponding to insertion of the diaphragm below which there is a flaring of the ribs (Harrison's groove), occasionally funnel shaped depression of lower part of sternum.

3. *Spinal column*—Lateral curvature common; in severe cases posterior curvature due to weakness of muscles, which disappears if child is suspended from armpits.

4. *Extremities*—Epiphyseal enlargement at wrists and ankles; knock-knee and bow legs; coxa-vara, curving of bones of forearm outwards; rachitic dwarfism in bad cases. Multiple green stick fractures in atrophic rickets. Deformities may occur due to malunion.

5. *Ligaments and muscles*—relaxed and weak hence deformity of spine, late standing and walking and over extension of knee joints—"acrobatic rickets".

6. *Digestive system*—Pot-belly due to weakness of abdominal muscles, tympanitic distension due to chronic gastro-enteric disturbances, and enlargement of liver and spleen.

7. *Nervous symptoms*—Restlessness at night with rocking of head on the pillow. Predisposition to convulsions, profuse sweating of the head during sleep.

8. *Respiratory system*—Adenoid and tonsillar hypertrophy, rhinitis, pharyngitis, bronchitis and bronchopneumonia common. In severe cases acceleration of respiration with largely diaphragmatic breathing.

4. *Tracheostomy*—if laryngeal spasm or dysphagia.
5. *Curarization and intermittent positive pressure respiration*—indicated in patients with severe spasms not controlled by sedation and in those developing respiratory failure due to uncontrolled rigidity and spasms of respiratory muscles.
6. *Control of fluid and electrolyte balance and nutrition*—IV fluids and electrolytes. High protein diet by mouth or through nasogastric tube or gastrostomy, or nasojejunal intubation in infants.
7. *Control of sympathetic overactivity*—(a) Tachycardia—Propranolol 10 mg 6-hourly. (b) Hypertension— $\alpha$-blocker such as phenoxybenzamine or bethanidine. (c) Hypotension—Head low position. (d) Hyperpyrexia—Cooling measures
8. *General measures and physiotherapy*—to prevent bed sores and complications of prolonged unconsciousness. Heparin to prevent deep vein thrombosis.

**Prevention—**

1. *Immunization*—(a) *Active immunization*—with 1 ml alum precipitated toxoid to be repeated after 3 months, or 3 doses of 1 ml each at 3-4 weeks intervals. For prevention of tetanus neonatorum and puerperal tetanus the pregnant woman must be vaccinated against tetanus unless she has received a booster dose within the previous 5 years. (b) *Passive immunization*—with HTIG or if not available ATS for all wounds except clean, minor wounds.
2. *Destruction of spores*—e g., in operation theatres by filtered ventilation and by use of antiseptics on floors and walls. $\gamma$-irradiation or autoclaving of surgical instruments and dressings. Povidone-iodine for skin decontamination
3. *Treatment of wounds*—Thorough cleaning, removal of foreign material and debridement of necrotic tissue. Use of antimicrobials.

## 15. ANAPHYLACTIC REACTION AND SERUM SICKNESS

**Causes:** (1) Injection of serum. (2) Drugs—Penicillin, streptomycin, vitamin $B_1$. (3) Insect stings particularly those of the bee, hornet and wasp (4) Ingestion of food sometimes, e.g. seafood, nuts, cottonseed.

2. *Larger doses of 50,000 units daily*—when the thorax is badly affected and breathing becomes difficult. The dose is reduced after the X-rays show signs of healing.

3. *Massive doses of vitamin D*—600,000 I.U. of Vitamin D (15 mg. calciferol) in oil solution intramuscularly or by mouth. Indications—children with severe rickets whose treatment cannot be continuously supervised, resistant rickets, and some cases of coeliac disease. Effect of one injection lasts for about 3 months. 3-4 injections should be given at intervals of 2 weeks each.

4. *Refractory rickets*—As much as 1,500,000 units of vitamin D daily with maintenance doses of 300,000 units per day subsequently. Administration of neutral phosphate salts along with massive D reduces the requirements of vitamin D considerably and is helpful in healing rickets. Cause of refractory rickets should be established and treated.

   Toxic effects of vitamin D—nausea, vomiting, abdominal cramps, and later muscular weakness or pain and dizziness, excessive thirst, polyuria, irritability. Level of serum calcium and inorganic phosphorus rises and urine may contain calcium casts. X-rays of radius and ulna show deposits of calcium salts.

B. Calcium—A compound of calcium and phosphorus preferable. Large doses of calcium are unnecessary and may even be harmful. It is only in presence of tetany that dose of calcium has to be increased.

C. Use of cereals—In diet should be restricted because phytate of cereal combines with calcium to form an insoluble compound which is passed out in the faeces. Lactose is antirachitic.

## 14. SCURVY

**Etiology:** Due to deficiency of vitamin C. Age—usually between 9 months to 2 years. Diet—more common in artificially fed infants. Precipitated by febrile disease, infections or diarrhoea.

**Clinical features:**

1. *Onset*—(i) Usually gradual—fretfulness and increasing pallor, or tenderness of legs which causes child to cry whenever touched, digestive disturbances and loss of weight (ii) Rarely sudden onset, the first symptom being inability of the child to use his legs.

4. LOCAL HYPERSENSITIVENESS—Reinjection at the site of recent previous injection of serum is followed by local pain, swelling, redness, and even necrosis.
5. POLYNEURITIS AND PARALYSIS—localised, e.g., brachial plexus, or widespread.
6. HOMOLOGOUS SERUM JAUNDICE—after injection of human blood products like convalescent serum, blood or plasma transfusion, etc.

**Management** of anaphylaxis :

1. *Adrenaline*—5 to 10 minims injected subcutaneously, may be repeated if necessary at interval of ½ to 2 hours.
2. *Tourniquet*—Constrict the arm or thigh with tourniquet or sphygmomanometer cuff well above the injection site if injection is given I.M. or subcutaneous. Remove and reapply tourniquet every 15 minutes until throat irritation, dyspnoea or other serious manifestations have abated.
3. *Corticosteroids*—Intravenous hydrocortisone 100-200 mg. or dexamethasone 4-8 mg.
4. *Antihistamine drugs*—by mouth, or in acute anaphylactic shock I.M. or I.V. as required.
5. *Treatment of shock*—Raise foot of bed, use noradrenaline and stimulants like nikethamide or micoren if respiratory depression.
6. *Bronchodilators*—such as salbutomol or terbutaline, or IV aminophyllin.

PREVENTION OF SERUM REACTIONS—

1. History of allergy or previous serum treatment.
2. Keep an injection of adrenaline or hydrocortisone ready.
3. Patient must be kept under observation for atleast 30 minutes afterwards.
4. Intravenous administration should not be attempted unless patient is in hospital, or there are adequate facilities for treatment of shock.
5. Sensitivity tests in individuals suspected to be hypersensitive—(a) Intradermal test—Inject 0.2 ml. of 1 : 20 dilution of the therapeutic serum intradermally. Raised wheal with pseudopodia after 10-20 minutes indicates positive reaction. (b) Conjunctival test—0.2 ml. of 1 : 20 dilution dropped into eye. Reddening of conjunctivae denotes sensitivity.

*Desensitization*—See antitoxin treatment of diphtheria.

## 15. INFANTILE DIARRHOEAS

**Classification:**

1. *Acute*—(i) Dietetic. (ii) Infective. (iii) Parenteral.
2. *Chronic*—(i) Worm infestations—e.g., giardiasis, tape worms, amoebiasis, etc. (ii) Malabsorption syndrome such as mucoviscidosis. (iii) Intestinal tuberculosis. (iv) Ulcerative colitis.

I. **Dietetic diarrhoea**—(a) Excessive quantity of food—overfeeding. (b) Excess of fats—loose, curdled, sour smelling stools. (c) Excess of carbohydrates—more common. Enzyme deficiency green, frothy, acid stools. (d) Allergy to certain foods —Milk intolerance due to lactase intolerance (enzyme lactase deficiency) or milk protein allergy (more common with cow or baffalo milk).

II. **Infective diarrhoea**—E. coli. klebsiella, salmonella, shigella, staphylococci, campylobacter, yersinia, viruses (Rotavirus).

SYMPTOMS—

*Mild case*—Onset with loose diarrhoeal type of stools with sometimes vomiting. Gradual increase in frequency of stools; greenish, slightly offensive with mucus and curds, varying in number from 2-3 to 10-12 per day. Slight fever.

*Severe case*—Onset moderately severe with or without vomiting. Stools soon become watery and odourless. Rapid dehydration as evidenced by thirst, dry tongue, depressed anterior fontanelle, loss of elasticity of skin and sunken abdomen. Fever, restlessness, tachycardia and oliguria. Later symptoms of toxemia—apathy, staring sunken eyes, shallow respirations, uncountable pulse, cyanosis, acidotic breathing. Temperature high or sub-normal. "Cholera infantum" or acute toxic diarrhoea—In a very severe case rice water stools and symptoms of toxemia. Abrupt onset with high fever and extreme prostration, vomiting, irritability, restlessness and often convulsions, collapse, suppression of urine and finally stupor and coma.

III. **Parenteral diarrhoea**—At onset of any acute infection e.g. acute otitis media and mastoiditis, infection of respiratory tract, acute pyelitis and meningitis. Tooth eruption.

**Management:** of infantile gastro-enteritis.

1. FLUIDS—
   (a) *Solution used*—(i) Ringer lactate—Full strength 1 : 20 with 5% glucose or ½ strength. Potassium chloride (1 ml = 2 mEq) 2 to 4 ml may be added extra in 500

**Clinical manifestations of malignant (pernicious) malaria—**

1. *Cerebral*—Headache, drowsiness, coma, epileptiform convulsions, meningism, aphasia, amblyopia, acute psychic manifestations such as mania, delusional insanity, symptoms resembling alcoholism, melancholia
2. *Hyperpyrexia*—With excitement, delirium and convulsions that may be mistaken for heat stroke or intoxication
3. *Algid*—Sudden collapse alone, or collapse associated with vomiting, diarrhoea, muscular cramps, and suppression of urine, shallow respiration and cold and clammy skin. Algid attack often develops during an apparently mild attack of falciparum malaria.
4. *Renal failure*—Oliguria sometimes proceeding to anuria, with associated uremic symptoms.
5. *Gastro-intestinal*—(a) Bilious remittent fever—Plasmodial hepatitis with increase in both unconjugated and conjugated bilirubin, enlarged tender liver and usually a palpable spleen. (b) Choleraic—Severe vomiting and choleraic diarrhoea (c) Dysenteric—Blood and mucus in stools. Temperature usually slight. (d) Simulating typhoid.
6. *Anemia*—depends on severity and duration of malarial attack.
7. *Jaundice*—with or without hepatic failure.
8. *Black water fever*—rare since synthetic antimalarial drugs have replaced quinine. Its essential feature is intravascular hemolysis. Severe anemia develops rapidly and renal failure is the most frequent cause of death.

**Other specific characteristics—**

*P. ovale and P malariae infection*—Clinical picture of P ovale malaria closely resembles that of vivax malaria. The important features of P malariae are asymptomatic septicemia, and quartan malaria nephrosis.

**Diagnosis :**

1. *Clinical*—Periodic fever with rigor, sweating, anemia and perhaps enlarged spleen.
2. *Blood film*—Identification of the parasites in peripheral blood. The common microscopic characters of falciparum malaria are—high concentration of parasites, predominance of thin ring-shaped trophozoites, more than one ring in some red cells and presence of sausage-shaped gametocytes.

(b) *Stomach wash*—indicated if vomiting is persistent, especially with much mucus.

4. ANTIMICROBIAL DRUGS—seldom necessary.
   (i) Sulphonamides—Sulphadizine or sulphafurazole 1 g. per pound body weight per day, or sulphaguanidine or sulphasuxidine 0.2 g./pound/day in 6-hourly doses, or—(ii) Antibiotics—(a) Streptomycin—20 mg. orally every 4 hours, or (b) Chloramphenicol 20 mg/pound (50-100 mg /kg) body weight/day in divided doses. Chroramphenicol with equal proportion of streptomycin more useful, or (c) Neomycin—25 mg./lb. body weight in four divided doses per day. (d) Furazolidine—25-50 mg. q.d.s. (e) Colistine sulphate—5-8 mg./kg.

5. MANAGEMENT OF SEVERELY ILL BABIES—(with severe dehydration and peripheral circulatory failure)—Young infants tend to be hypothermic and may need to be nursed in an incubator. After taking blood for electrolyte estimation, 20 ml./kg. of plasma or 0.9% glucose saline is given as rapid IV infusion. If the serum sodium is normal, the remainder of fluid deficit is replaced as 0.45% glucose saline 40 ml./kg. over 3 or 4 hours. Potassium is added if baby is passing urine, though oral replacement is safer. For metabolic acidosis (deep rapid respiration)—3 mmol/kg body weight of sodium bicarbonate by slow IV injection. Calcium gluconate 10 ml 10% in 24 hours may be required as acidosis and hypokalemia are corrected.

## 16. INDIAN CHILDHOOD CIRRHOSIS (ICC)

**Etiology**: (a) *Incidence*—Disease peculiar to Indian subcontinent with 80% of all cases of cirrhosis in India. (b) *Age*—between 1-3 years usually, may occur in older children also. (c) *Sex*—Apparently more common in males, usually first male child after many females. (d) *Familial incidence*—known but definite inheritance not defined. (e) *Community*—Mainly Hindus. Common in Agarwals and 'Banyas' (N. India) and Brahmins of S. India.

**Etiopathogenesis**—Appears to be a response of a genetically inferior liver to viral infection. Theories—

1. *Nutritional*—Seen in traditional vegetarians Rare in poor and malnourished, commoner in middle income groups. No dietary deficiency appears to contribute.
2. *Viral infection*—appears logical because of febrile onset and leucocytosis. 20% of ICC patients have recent family his-

vulsions—Diazepam or paraldehyde. (b) *Hyperpyrexia*—Tepid water sponging or covering with wet sheet and fanning vigorously, or alcohol sponging. (c) *Fluid balance*—Excessive fluid loss is not a feature of malaria. (d) *Acute renal failure*—Hemodialysis, or peritoneal dialysis. (e) *Shock or diarrhoea*—Correction of fluid and electrolyte disturbance, IV plasma and steroids. (f) *Severe anemia*—Packed red cells carefully matched and cross-matched. (g) *Black water fever*—Packed red cells, corticosteroids and hemodialysis. Chloroquine is the antimalarial of choice in this condition.

CHEMOPROPHYLAXIS—One of the following drugs should be taken one week before arrival in an endemic area and then continuously throughout the period of stay and for one month after leaving the endemic area:

*Chloroquine-sensitive areas*—One of the following drugs (adult dose):

Proguanil (Paludrine) 100-200 mg daily
Chloroquine 300 mg weekly
Pyrimethamine (Daraprim) 25 mg weekly.

*Chloroquine-resistant areas*—One of the following:

Fansidar (Pyrimethamine 25 mg + sulfadoxine 500 mg) One tablet weekly
Maloprim (Pyrimethamine 12.5 mg + Dapsone 100 mg) One tablet weekly.

TOXICITY OF ANTIMALARIAL DRUGS—(a) Chloroquine—Nausea, vomiting, transient pruritus. Ocular complications associated with intensive regime do not occur with antimalarial therapy. (b) Amodiaquine—Agranulocytosis may occur. (c) Quinine—Tinnitus, deafness and dizziness. (d) Primaquine—Cyanosis due to presence of methemoglobin, colicky abdominal pains. Acute hemolysis may occur in G6PD-deficient individuals.

## 2. KALA-AZAR (VISCERAL LEISHMANIASIS)

**Etiology:** *Caused by*—protozoan parasite Leishmania donovani. *Transmitted by*—Phlebotomus sand flies mostly from infected man to susceptible individuals, by saliva and nasal secretions when the mucosae are involved and rarely even by faeces Rarely transmitted from reservoir of infection in domestic animals such as dogs or rodents. *Peak incidence*—in children of about 12 years. The Mediterranean disease affects more particularly infants.

*Incubation period*—varies between 2 weeks-18 months.

**Investigations:** (1) Leucocytosis. (2) Urinary glycosuria. (3) Increased conjugated bilirubin. (4) Elevated alkaline phosphatase. (5) Decreased serum albumin (later). (6) Increase in gamma globulins, mainly IgM. (7) Decreased serum complement. (8) Impaired tests of cell mediated immunity. (9) Positive Australia antigen in few cases. (10) Miscellaneous—Increased alfa foetoprotein, low alpha-1-antitrypsin, low serum zinc, excess liver copper. (11) Liver biopsy—to establish the diagnosis.

**Management:**

I. GENERAL—(1) *Diet*—Balanced diet in compensated state. Salt restriction, protein supplements with additional glucose in presence of oedema and ascites. Protein restriction (1 g/kg/day) in hepatic coma. (2) *Vitamins*—specially A, D and E orally. Vitamin K 5 mg IM for 3 days if there is bleeding. (3) *Diuretics*—Spironolactone 2 mg/kg/ day or Frusemide 2 mg/kg/day if oedema and ascites with oral potassium chloride (4) Treatment of hepatic coma—IV glucose, protein restriction, oral neomycin, high bowel washes, treatment of infection. (5) Liver extracts, vitamin $B_{12}$ of no therapeutic value.

II. SPECIFIC—None of the therapies of proved value.

(1) *Steroids*—Prednisolone 1-2 mg/kg/day for 2-3 weeks followed by half the dose on alternate days for several months if improvement seen. (2) *Gamma globulin*—0.1-0.3 ml/kg IM every 3 weeks for 1-2 years has been used with some benefit. (3) *L-tetramisole*—a drug stimulating cell mediated immunity has not proved of value. (4) *Copper stimulating chelating agents*—D-penicillamine has been tried. (5) *Zinc therapy*—30-120 mg/day. Some have claimed improvement.

PREVENTION—Early cases detected by palpating livers of 6 months to 3 year old siblings of patients. Gamma globulin in this vulnerable period may help. Also steroid therapy.

## 17. BRONCHOPNEUMONIA AND ACUTE BRONCHIOLITIS

**Etiology:** Age—more common during first 2 years. Predisposing factors—weak and marasmic children, rickets, or infective fevers like measles and whooping cough. Most epidemics of acute bronchiolitis are due to the respiratory syncitial or other virus. In children with allergic diathesis any respiratory infection can trigger off bronchiolar spasms.

*Lymph glands*—may be enlarged (especially cervical glands in the Mediterranean form).

**Unusual forms:**

*Lymphatic form*—Localised tonsillar infection with cervical adenopathy or generalised lymphadenopathy. These occur in the Mediterranean.

*Nasopharyngeal and oral lesions*—Granulomatous tumors of nose, nasopharynx and larynx are a feature of the African disease.

*Skin lesions*—Post kala-azar dermal leishmaniasis appears during or after treatment. There are two constituents—a macular depigmented rash on face and trunk and a papular eruption on face and upper trunk.

**Diagnosis:**

1. *Demonstration of Leishman-Donovan bodies*—in stained marrow smears, or splenic smear or lymph gland. They may be cultured on NNN medium (21 days) or Schneider's insect medium (3 days) or inoculated intraperitoneally into hamsters (3-6 months).
2. *Serological tests*—(a) *Leishmanin test*—becomes positive only 6-8 weeks after recovery. (b) *Complement fixation*—Positive titres of 1/20 upwards develop early and last as long as infection is active. (c) *Immunofluorescence*—Fluorescent antibody test becomes positive early and titre of 1/128 is diagnostic of active infection. (d) *Formol gel test*—2 drops of 40% formalin are added to 2 ml of serum and shaken A dense white opacity with solidification of the serum after 20 minutes is a positive test. Positive tests may be found in conditions with high immunoglobulins such as malaria with splenomegaly, leprosy, hepatosplenic schistosomiasis and other gammopathies.
3. *Leishmanin skin test*—Delayed reaction to intradermal Leishmania antigen is suppressed during active kala-azar.

**Treatment:**

1. DRUGS:

   (a) *Pentavalent antimony compounds*—(i) Sodium stibogluconate drug of choice. Dose—6 ml. (600 mg.) IM or IV daily for 6 days. Can be repeated if fever recurs.

   (b) *Diamidines*—(i) Pentamidine 3 mg./kg. body weight on alternate day I.V. or I.M. for 7-10 days. (ii) Hydroxystilbamidine isethionate— 5 mg./kg body weight

scattered parenchymal infiltration in acute bronchiolitis. In bronchopneumonia lesions diffuse, multifocal and bilateral. Confluent areas of bronchopneumonia may simulate lobar pneumonia. Staphylococcal—breaking down and cavitary lesions seen which heal as thin walled sacs (pneumatoceles) which persist quietly for a year.

**Treatment:**

1. *Nursing*—Good nursing essential to conserve child's energy.
2. *Diet*—Small frequent feeds of either sugar water or dilute milk.
3. *Sedatives*—to be used judiciously, may be indicated if restlessness is distressing but this may be due to hypoxia which only a high concentration of $O_2$ will relieve.
4. *Antibiotics*—Crystalline penicillin 1-4 lakh units kg/IV 6-hourly, or Ampicillin 100 mg./kg./day, or Amoxycillin 25 mg./kg. day in divided doses 6-8 hourly. Chloramphenicol or gentamicin may be added. If due to staphylo, cloxacillin 100-200 mg. IV 6-hourly. The course of virus disease will not be altered but secondary infection will be controlled.
5. *Symptomatic treatment*—
   (a) Cough—In early stages when cough is dry sedative linctus, later expectorant mixture for older children, no use in infants and toddlers who cannot expectorate.

   | | |
   |---|---|
   | Amm. Carb. .. .. .. | 0.2 g. |
   | Soda Citras .. .. .. | 0.2 g. |
   | Ext. Glycerh. liq. .. .. .. | 5 m. |
   | Syrup Tolu ad .. .. .. | 1 dr. |

   One teaspoonful t.d s.

   Ephedrine, orciprenaline, salbutamol or terbutaline should be added if bronchospasm.

   (b) Cyanosis—Oxygen.

   (c) Collapse—Simultants like coramine or micoren. Corticosteroids. Digitalization may be necessary if there is cor-pulmonale.

   (d) Fever—Aspirin or paracetamol may be used.

   (e) Abdominal distension—Enema and rectal tube.

## 18. ACUTE RHEUMATIC FEVER

**Etiology:** *Predisposing causes*—*Age*—maximum 5-15 years. *Sex*—equal incidence, later in boys. *Genetic factors*—Familial incidence known. *Social and economic factors*—Dampness,

3. *Patients with severe diarrhoeal attacks*—Semifluid or fluid stools with perhaps mucus but no blood. Attack usually does not last more than a week.
4. *Patients suffering from dysentery*—Acute or chronic.

**Diagnosis :**

(i) *Amoeboid trophozoites* with ingested red cells demonstrated either in stools, in biopsy material, or in scrapings taken from an ulcer at endoscopy. Asymptomatic intestinal amoebiasis is diagnosed by finding amoebic cysts in the stools. A single negative finding does not exclude the diagnosis. (ii) *Serology*—useful in suspected amoeboma or amoebic liver abscess.

**Amoebic dysentery :**

*Incubation period*—7 to 14 days.

CLINICAL TYPES—

1. *Typical acute type*—Acute onset, 10 to 20 stools per day with mucus and blood. Abdominal pain first diffuse, later in right iliac fossa. Temperature normal or about 100°F.
2. *Diarrhoeal onset*—Symptoms and signs as above but milder.
3. *Fulminating*—Many bulky and offensive stools with gangrenous sloughs, dark blood and pus Severe abdominal pain, rigidity of abdominal muscles. Prostration, and toxemia. Collapse.
4. *Chronic amoebic dysentery*—Repeated attacks of loose stools with little blood and mucus, alternating with periods of constipation. Slight pain and definite tenderness in the abdomen usually in the area of caecum. Liver may be tender. Loss of weight, dyspepsia and malaise.

**Differential Diagnosis :** from bacillary dysentery—

| | *Amoebic dysentery* | *Bacillary dysentery* |
|---|---|---|
| Epidemiology .. | Endemic, rarely epidemic | Epidemic in temperate climates, endemic and epidemic in tropics |
| Age ... | Uncommon in children | Common in children |
| Incubation period . | Fortnight or months | One week or less |
| *Symptoms*— | "Walking" dysentery | "Lying down" dysentery |
| Onset ... | Insidious | Acute |

joint inflamed for 4 to 6 days, recovers and is not again affected. (b) Polycyclic—joints which have recovered again get involved. Recurrence of arthritis and fever as soon as influence of drug wears off. (c) Continuous form —persistence of some evidence of active infection often varying in intensity from time to time.

*Jaccoud's arthritis*—is a rare sequel to repeated attacks of acute rheumatic fever. The features are—(a) Hands and feet are affected, the typical deformity of hands is of marked ulnar deviation of ring finger and slight ulnar deviation of other fingers. (b) Absence of pain. (c) Periarticular fibrosis (d) Effusions rare, when present seen in metacarpal heads. (e) Tests for rheumatoid factor negative and ESR normal.

2. FEVER—Almost always present. Types—(i) Irregular but well marked. The temperature may rise to 101-103°F. shows daily variations of 1°–3°F. Duration variable, may last from a few days in mild cases to a few weeks in severe attacks. (ii) Continuous low grade fever. (iii) Continuous low grade fever with acute exacerbations during relapses. (iv) Hyperpyrexia may rarely occur with delirium, convulsions, and coma.

3. CARDITIS—Rheumatic carditis is an acute inflammatory process that may involve the endocardium, myocardium or pericardium and frequently a combination of all three.

*Endocarditis*—or valvulitis is indicated by the presence of a significant heart murmur not previously noted—(a) *Systolic murmur* of mitral regurgitation may be heard early in the course of the illness. (b) *Carey Coombs murmur*—Mid-diastolic murmur localised at the apex due to acute mitral valvulitis. It may be transient. (c) *Basal diastolic murmur* of aortic regurgitation due to acute involvement of aortic valve may be heard. The murmur of MR is more likely to disappear whereas the murmur of acute AR usually persists. A mitral stenotic murmur develops only some years after acute episode of rheumatic fever.

*Myocarditis*—is suggested by—(a) Tachycardia disproportionate to the fever. (b) Decrease in intensity of 1st heart sound indicating first degree A-V block. (c) Diastolic gallop rhythm or early signs of failure (such as tachypnoea and shortness of breath).

*Pericarditis*—occurs in patients with severe carditis and is indicated by a friction rub. Large pericardial effusion is uncommon.

abdomen. Rarely first noticed when abscess bursts through lung or bowel.

(a) *Pain or discomfort in liver area*—At first dull and aching or sensation of heaviness in right hypochondrium, later sharp and stabbing; usually over hepatic area, rarely in epigastrium or axillary region. Pain is referred to tip of right or left shoulder when abscess is located high in one or other lobes of the liver, and there is commonly an irritant cough. Pain on firm pressure with fingertips in an intercostal space and over a limited area (compression test) common and valuable localising sign. Pain may be increased by deep inspiration or coughing. Patient tends to lean to the left side to relieve the pain.

(b) *Enlarged tender liver*—Localised visible bulge may be seen in epigastrium, right hypochondrium or lower intercostal spaces.

(c) *Local oedema*—of chest or abdominal wall.

(d) *Icterus*—rare in hepatic amoebiasis. Rarely deep jaundice due to obstruction by an abscess of intrahepatic bile ducts.

(e) *Abdominal tenderness*—Marked tenderness over caecum and colon if associated dysentery.

(f) *Constitutional symptoms*—(a) Fever initially high, later remittent or intermittent. Rigors may occur and indicate threatened rupture. (b) Profuse sweats. (c) Emaciation. (d) Sallow skin. (e) Rheumatic like pains in joints.

(g) *Pain in right shoulder*—Referred pain accentuated by deep breathing or coughing if the abscess is near the diaphragm.

(h) *Symptoms due to extension of abscess*—(i) *Lung*—Through anterior abdominal wall or through chest wall or through diaphragm into pleura or lung, or penetration of bronchus followed by coughing up of usually chocolate coloured material. (ii) *Pericardium*—A left lobe abscess may extend into pericardium. (iii) *Peritoneum*—May burst into peritoneum presenting as an acute abdomen. (iv) *Bile duct*—May press upon bile duct and manifest as obstructive jaundice. (v) *Intestines*—Rarely it may work its way into the colon or duodenum when the patient may have a large loose

Titre < 250 considered normal, 250-320 borderline elevated. Eighty per cent of rheumatic fever patients have higher than 250 units/litre of which 60% are above 500 units. Serial rises more significant. Antistreptozyme test (ASTZ) —Tests for 5 streptococcal enzymes antigenically more accurate diagnostically. The titre usually rises within 1-2 weeks and increases until a maximal level is reached 3-5 weeks after infection.

2. *Acute phase reactions*—not specific for rheumatic fever. (a) *ESR*—elevated. (b) *C-reactive protein*—reflects rheumatic activity more precisely than ESR. (c) *Serum proteins*—Significant elevation of serum haptoglobin common in acute phase.

3. *Miscellaneous*—(i) *Anaemia*—mild to moderate. Persistence of anaemia is often a sign that rheumatic inflammation is still present. (ii) *Electrocardiography*—(a) Disturbance of conduction—Prolonged PR interval or more severe grades of heart block. (b) Changes associated with myocarditis. (c) Abnormalities secondary to pericardial involvement. (iii) *X-ray chest*—Cardiac enlargement may help to confirm diagnosis of carditis in equivocal cases.

MODIFIED JONES' CRITERIA FOR DIAGNOSIS OF RHEUMATIC FEVER :

| *Major criteria* | *Minor criteria* |
|---|---|
| Carditis | *Clinical*— |
| Polyarthritis | Fever, arthralgia (not if there is major arthritis) previous rheumatic fever or RHD. |
| Chorea | *Laboratory*— |
| Subcutaneous nodules | Raised ESR, leucocytosis, C-reactive protein, PR prolongation on ECG (not if there is major carditis). |
| Erythema marginatum | |

| *Supportive of streptococcal infection* | *Other findings* |
|---|---|
| Recent scarlet fever | Recent sore throat |
| Throat culture positive for group A streptococci | Family history of rheumatic fever |

(d) *Amoeboma* (Amoebic granuloma)—Sausage shaped fibrotic mass in caecum, transverse colon, sigmoid or rectum simulating carcinoma; may cause intestinal obstruction. Disappears completely with emetine treatment.

(e) *Post-dysenteric colitis*—(a) A milder functional form constituting the irritable colon syndrome. (b) Ulcerative post-dysenteric colitis a direct sequel to severe amoebic dysentery.

(f) *Stricture*—May form at a site of severe ulceration commonly in rectum and descending colon. May be multiple and are not uncommon in those who have recovered from peritonitis and in those with post-dysenteric colitis The presence of a mass of palpable faeces in the left iliac fossa is a common clinical manifestation.

(g) *Intussusception*—May occur at the site of an amoebic ulcer in the large bowel.

(h) *Amoebic appendicitis*—Infection of appendix by E. histolytica due to extension of caecal amoebiasis is not unusual, and with secondary bacterial invasion, clinical picture of subacute appendicitis may be encountered.

(i) *Amoebic typhlitis*—Sometimes the localisation of amoebae is confined to the caecum and ascending colon and the clinical picture may be that of chronic typhlitis rather than acute dysentery.

3 PULMONARY AMOEBIASIS—

(a) *Lung abscess*—

(i) Primary—Development of small bronchopneumonic areas due to embolic invasion of the pulmonary circulation by E histolytica.

(ii) Secondary—(a) Pulmonary abscess extending from liver abscess. The liver abscess gets through adherent visceral pleura into the lung and the patient has incessant cough and brings out chocolate-coloured material for one or two days followed by blood-stained expectoration (bronchobiliary fistula). (b) Broncho-hepatic fistula with pulmonary involvement. (c) Consolidation. (d) Empyema extending from liver abscess.

(b) *Bronchitis and bronchopneumonia*—sometimes amounting to gangrene.

7. *Sensitivity reaction*—to drugs, serum sensitivity and certain food allergies may cause migratory polyarthritis similar to rheumatic fever. Often associated urticaria.

8. *Collagen diseases*—Polyarthritis can occur early in the course of polyarteritis nodosa, lupus erythematosus and dermatomyositis. The arthritic symptoms are usually mild and other characteristic features are either present or emerge as the patient is observed.

**Management:**

1. *Rest and nursing care*—Rest in bed. Speed of ambulation should be varied according to the severity and course of the rheumatic attack. In patients with polyarthritis without carditis, prolonged bed rest is not necessary. Children with signs of minimal cardiac involvement should be kept in bed till there is no evidence of progressive cardiac affection; physical activity is then gradually increased over 4-6 weeks. Patients with definite myocarditis and valvulitis should be kept in bed until: (i) the intensity of heart murmur has diminished or has become stabilized, (ii) heart sounds are of good quality, (iii) sleeping pulse rate is below 100 per minute, (iv) hematrocrit is rising or normal and the CRP is negative, and (v) there is a true weight gain. Convalescence may often take 6 months or longer.

2. *Diet*—Aim is to maintain nutrition. Only fluids if moderate or high fever. Vitamins and minerals.

3. *Drugs*—control acute exudative manifestations.

   (a) *Antibacterial agents*—Every patient should receive 200,000 units of penicillin by mouth q.d s. for 10 days. If sensitive to penicillin give erythromycin 250 mg. q.d.s. After 10 days, continuous prophylaxis with penicillin should be started immediately.

   (b) *Anti-inflammatory agents*—

      (i) *Salicylates*—in the form of Aspirin 120 mg per kg body weight per day in 3-4 divided doses taken in milk or after meals. Continued for 2 weeks for arthritis and 6 weeks for carditis. Signs of aspirin toxicity are—vomiting, tinnitus, and hyperpnoea. If these occur the drug should be discontinued for one or two days and then restarted in a lower dose.

      (ii) *Steroids*—should be given when there is marked cardiac enlargement, failure, pericarditis. They

| *Drug* | *Dosage* | *Remarks* |
|---|---|---|
| (5) *Oxyquinoline derivatives*— | | |
| (a) Clioquinol | 500 mg. t.d.s. for 10 days by mouth. | Less effective than diloxanide. Implicated in production of SMON. |
| (b) Diodohydroxyquin (Diodoquin) | 650 mg. t.d.s. for 20 days. | No toxic manifestations. May be repeated after 2-3 weeks. |
| (6) *Aminoquinolines*— Chloroquine | 250 mg. q.d.s. for 2 days. Then 250 mg. b.d. for 2-3 weeks | Low toxicity. Effective in hepatic amoebiasis. |
| (7) *Phenanthrolines* Entobex | 100 mg. t.d.s. for 10 days. | Useful for chronic amoebiasis. |
| (8) *Diethylaminocresol*— Camoform | 0.25-0.5 gm. t.d.s. with meals for 5 days. May be repeated after 3 weeks. | Effective against both intestinal and extra-intestinal amoebiasis. Well tolerated. |
| (9) *Antibiotics*— Tetracycline (must be used with amoebicidal drug in severe cases) | 500 mg. 8-hourly for 10 days | Alters the associated intestinal bacterial flora essential to the survival of the amoebae. |

*Intestinal amoebiasis*—Combination of drugs—Metronidazole 400 mg t.d.s. or Tinidazole 600 mg b.d. for 5 days combined with diloxanide furoate 500 mg. t.d.s. for 10 days. For severe dysentery Inj. dehydroemetine 65 mg daily for 10 days followed by oral treatment. A test of cure should be carried out 2-4 weeks after treatment has been completed taking atleast three specimens for examination.

*Liver abscess*—(a) *Drugs*—Emetine hydrochloride 65 mg daily for 10 days with chloroquine 250 mg. b.d. after food for 14 days, or metronidazole 800 mg. t.d.s. for 10 days. Later a course of diloxanide 500 mg. t.d.s. for 10 days or iodohydroxyquinoline 900 mg t.d.s. for 21 days to eliminate any persistent colonic infection. (b) *Aspiration*—with a wide-bore needle. *Indications*—Palpable mass, persistent localised tenderness, markedly raised hemidiaphragm and failure of symptoms to remit on drug therapy. *Site*—The needle is introduced into area of maximum tenderness or into 8th or 9th intercostal spaces in mid-

## Rheumatic Chorea
## (Sydenham's Chorea, St. Vitus' Dance)

**Etiology:** *Age*—maximum incidence at 10th year, rare after puberty. *Sex*—twice more common in girls. *Predisposing factors*—Mental strain, e.g. overwork at school, fright or shock, or pregnancy in young females. *Exciting cause*—Majority due to acute rheumatic fever. Rarely scarlet fever, diphtheria, encephalitis, chickenpox. Chorea is regarded as a diffuse meningo-encephalitis affecting the basal ganglia, cerebral cortex and pia-arachnoid.

**Clinical features:** Triad of emotional instability, muscular weakness and purposeless movements.

*Onset*—Chorea may appear several weeks or months (usually more than 6 months) after an attack of acute rheumatic fever or it may be the initial symptom of a rheumatic episode. The onset is usually gradual. The child becomes increasingly nervous, tends to drop things and stumbles frequently. Speech becomes indistinct and characteristic purposeless movements of arms and legs develop.

1. *Involuntary movements*—(i) Face—constant bizarre grimacing. (ii) Tongue—when protruded it may be impossible to hold it quietly (Jack-in-the-box tongue) and its undulating jerky movements are described as those of a bag of worms. When asked to show the tongue, the child puts it out rapidly and may bite it to keep it out, or may jerk it back rapidly with reptilian speed. When talking the tongue produces a clucking sound. (iii) Ocular muscles may rarely participate in the involuntary movements. (iv) Extremities—Movements appear first in hands. When arms are outstretched in front, the posture is one of flexion at the wrist and hyper-extension at the metacarpo-phalangeal joints. If the upper limbs are held above the head, the palms face outwards (pronator sign). Lower extremities less affected. Gait may be clumsy. (v) Muscles of abdomen and neck may be involved. (vi) Respiration—alteration in rhythm. Breath is taken rapidly, held for some time, and let go with a sigh. Involuntary grunting noises common.

   Choreic movements are intensified by voluntary effort and excitement, and banished by sleep.

2. *Weakness of voluntary movements*—In mild cases little or no impairment of power, but in severe cases the choreic movements may become less marked but the limbs progressively weaker.

2. *Acute*—Abrupt onset, fever, anxiety, coated tongue, thirst, anorexia and perhaps delirium.
3. *Fulminating*—Sudden onset with chills, high fever, vomiting, headache, signs of acute toxemia, abdomen sunken and tender. Stools offensive and greyish; death from peripheral failure.
4. *Choleraic*—early collapse, light coloured stools with blood and mucus. Temperature subnormal.
5. *Relapsing*—urgency of attack subsides, but dysenteric symptoms do not completely disappear.
6. *Chronic bacillary dysentery*—symptoms reappear on slight indiscretion; unformed motions always contain mucopus and at times blood.

**Complications:** (a) *Dehydration*—In adults the signs are not prominent but consequences may be serious. Apathy and listlessness, sunken black-ringed eyes and dry mouth and tongue. (b) *Abdominal*—Intestinal hemorrhage frequent, perforation rare. Chronic peritonitis, portal pyemia, intussusception, rectal prolapse, granular proctitis. (c) *Systemic*—(i) Renal failure. (ii) Transient polyarthritis. (iii) Conjunctivitis and iritis. (iv) Pneumonia. (v) Parotitis. (vi) Peripheral neuritis. (vii) DIC.

**Management:**

1. *Rest in bed*—Use of bed-pan or absorbent pads if stools numerous.
2. *Fluids*—5% glucose in normal saline IV if dehydration. Oral electrolyte supplements if necessary.
3. *Antimicrobial therapy*—plays little part in shortening the course of the illness, their main use is probably for achieving a bacteriological cure. In severe cases Ampicillin 2 g. daily in four divided doses by mouth or IM in moderate or severe cases or co-trimaxozole.
4. *Symptomatic treatment*—(a) *Abdominal pain*—Hot water bag or poultice to abdomen. Injection of pethidine 50 mg. with atropine if severe. (b) *Tenesmus*—Bowel wash with normal saline or weak Condy's lotion or suppository containing dry extract of opium 120 mg. and belladona 30 mg. (c) *Acute renal failure*—Caution with IV fluid replacement because of risk of water and electrolyte overload Peritoneal dialysis may be necessary.

talization is therefore better. Attention to fluids and nutrition of children unable to feed themselves.

2. *Sedatives*—Phenobarbitone 5 mg/kg/day. Alternately chlorpromazine 2-3 mg/kg/day or haloperidol 0.2–0.5 mg/kg/day.
3. *Antistreptococcal treatment*—10 day course of penicillin followed by prophylaxis.
4. *Suppressive drugs*—Salicylates or steroids may be indicated in patients with signs of an active rheumatic inflammatory process.

## 19. TUBERCULOUS MENINGITIS

**Etiology:** *Age*—highest incidence in first 3 years. *Sex*—equal incidence. *Primary infection*—usually in lungs or mediastinal glands, or bowel and mesenteric glands. Tubercle bacilli carried in the blood stream produce caseous foci in brain, spinal cord or adjacent bones. It is only when these rupture into the cerebrospinal fluid that meningitis results.

**Clinical features:**

1. PRODROMAL STAGE OF IRRITABILITY—(i) Onset insidious, rarely acute with high fever. (ii) Change in temperament—irritability, restlessness, disinclination to play combined with periods of drowsiness. (iii) Headache; older children may complain of it, younger children may indicate their pain by screams and by putting their hands to head. (iv) Anorexia and vomiting. (v) Constipation often severe. (vi) Temperature normal or only slightly raised. This stage lasts for a week or more.
2. STAGE OF COMPRESSION—(i) Convulsions. (ii) Evidence of meningeal irritation—child lies curled upon side, stiffness of neck, positive Kernig's and Brudzinski's signs. (iii) Tense anterior fontanelle. (iv) Exaggeration of deep reflexes. (v) Grinding of teeth. (vi) Muscular twitchings. (vii) Squint usually internal, and ptosis. (viii) Temperature usually raised to 101-102°F sometimes high throughout the illness. (ix) Disturbances of consciousness.
3. TERMINAL STAGE OF COMA—(i) Irritability replaced by coma, child lies on back with eyes staring vacantly and dilated pupils. (ii) Rapid loss of weight and dehydration. (iii) Tachycardia and irregular pulse. (iv) Respiration irregular, often Cheyne-Stokes. (v) Tremors of limbs and occasionally choreic movements. (vi) Terminal hyperpyrexia. This stage

Vomiting may occur before onset of diarrhoea. Fever usual. More than one member of the family may develop same illness (ii) Due to preformed toxin—e.g. botulism. Apart from gastrointestinal symptoms, cranial nerve lesions predominate. (b) Viral (Summer diarrhoea)—In contrast to bacterial food poisoning, sporadic cases may occur over the course of a week or two. Pyrexia uncommon.

2. *Chemical poisoning*—e.g. arsenic, lead, mercury, cadmium, sodium fluoride, poisonous berries.
3. *Fulminating bacillary dysentery*—Fever, severe griping and tenesmus, sero-sanguineous stools, abdominal tenderness.
4. *Algid and choleraic forms of malaria*—History of previous attacks of fever, axillary temperature higher, enlarged spleen, stools less profuse and bile stained, also bile in vomits, malarial parasites in blood.

| | *Cholera* | *Food poisoning* | *Chemical poisoning* |
|---|---|---|---|
| Epidemiology ... | Associated with other cases in neighbourhood | Often single group of patients sharing same food | Usually one person |
| Incubation ... | 24-72 hours | 4-24 hours | ½-2 hours |
| Onset ... | With purging | With vomiting | With burning in throat followed by vomiting |
| Nausea and retching ... | None | Present | Marked |
| Diarrhoea ... | Early, watery and copious | Frequent, faecal and offensive | Delayed, single, massive followed by frequent blood and mucus |
| Tenesmus ... | None | Present | Marked |
| Abdominal tenderness . | None | Marked | Very great |
| Dehydration . | Marked | Present | Slight |
| Temperature .. | Subnormal | Raised | Normal or subnormal |
| Urine ... | Suppressed | Suppression rare | Sometimes suppressed late |

**Management:**

1. *Replacement of fluid and restoration of electrolytes*—(a) *Mild case*—1-2 litres of normal saline infusion followed by

| Characteristics | Virus encephalitis | Tuberculous meningitis |
|---|---|---|
| Organism ... | Bacteriologically sterile. Virus may be isolated | Myco. tuberculosis may be seen on direct microscopy. Culture may be positive in 6-10 weeks |
| Antibodies .. | Antibody to particular virus may rise with serial samples | Gamma globulin increased but no specific rise in a particular virus antibody |
| Colloidal gold curve | Paretic in some slow virus infections | Normal or mild (usually meningitic) change |

2. *Other types of meningitis*: (See page 678).

**Management:**

I. *General*—

1. Nursing—care of mouth and skin.
2. Fluids—1300-1400 ml/m$^2$, restricted to prevent cerebral oedema. Nasal feeds if child cannot take by mouth. Chiefly milk and orange juice.

II. *Specific*—should be given for 1½-2 years.

1. Streptomycin— 40 mg./kg. body weight once a day I.M. for three months.
2. Isoniazid—20 mg./kg. body weight as single dose daily.
3. Rifampicin—10-15 mg./kg. for 3 to 6 months. Advisable to employ all the three drugs at the same time.
4. Ethambutol—15-20 mg./kg. for 6 weeks to 3 months. (Refer treatment of pulmonary tuberculosis)
5. Pyrazinamide—30 mg/kg/day (upto 2.5 g/day).
6. Steroids—by mouth in order to reduce inflammatory reaction and thereby decrease the incidence of spinal or ventricular block and release the tubercle bacilli from the fibrinous exudate so that they are more exposed to the action of drugs. It also produces rapid improvement in the general condition of the patient. Initial therapy with 0.5 mg/kg IV dexamethasone for increased intracranial tension.

III. *Symptomatic*—

1. Convulsions—(i) Paraldehyde 2 ml. I.M. every 6 hours or (ii) Phenobarbitone 5-10 mg/kg IM stat, then 5 mg/kg once daily, or (iii) diazepam 0.25-0.5 mg./kg. IM or slowly IV.

gradually after 3-4 days, synchronous with the full development of the buboes. Temperature may rise again if and when the buboes suppurate. Congested eyes, speech dull resembling alcoholic intoxication. Marked prostration, delirium, vomiting and oliguria, retention of urine, coma and convulsions may occur. Thready pulse, dilatation of heart and perhaps hemorrhages in later stages. Spleen and liver enlarged. Death may occur on third or fifth day.

(c) *Stage of recovery*—Constitutional symptoms abate usually on 10th day with fall of temperature and perspiration. Bubo continues to enlarge and may burst, or suppuration may not occur.

2. *Primary pneumonic*—Rigor, malaise, vomiting, fever, and prostration. Chest pain, dry cough, dyspnoea and cyanosis with profuse, watery, blood tinged sputum. Hemorrhages frequent.
3. *Septicemic*—Systemic dissemination via blood stream with involvement of many organs. Hematogenous invasion of lungs results in secondary pneumonic plague.

UNUSUAL PRESENTATIONS—

*Cervical bubonic plague*—less common than inguinal, femoral or axillary forms.

*Carbuncular plague*—presents with ulcerating skin lesion.

*Meningitis*—may be the presenting feature and is diagnosed by isolation of Y. pestis from CSF.

**Laboratory diagnosis:**

1. *White cell count*—Leucocytosis with absolute predominance of neutrophils.
2. (a) *Detection of Y. pestis* in material from glands, blood (in septicemic form), sputum (in pneumonic cases), or discharge, by smear or culture. Stained blood film—Finding of bacilli resembling Y. pestis indicates poor prognosis. (b) *Animal inoculation*—Guinea pig dies in 3-5 days of plague septicemia.

**Management:**

1. *Specific*—Oral tetracycline 500 mg q d.s. for 10 days. For seriously ill patients addition of streptomycin 1 g b.d. for 3 days followed by 1 g o.d. for 7 days.
2. *Local*—In early stages buboes painted with iodine, or glycerine and belladona, or treated with infra-red rays.

6. *Anoxia*—Asphyxia neonatorum, breath holding spasms, whooping cough, Adams-Stokes syndrome, Fallot's tetralogy.
7. *Tetanus*.

**Diagnosis and investigation:**

**History:**

1. *Age*—

New-born—Intracranial birth injury, tetanus neonatorum, tetany of new born, hypoglycemia, inhalation asphyxia, kernicterus.

First 6 months—Febrile convulsions, acute infections, tetany, cerebral defects, CNS infections.

6 months to 3-4 years—Tetany, idiopathic epilepsy, breath holding spasms.

3-10 years—Idiopathic epilepsy, congenital defects of brain, residual cerebral damage from early trauma, infection, lead poisoning, brain tumor, acute nephritis and certain degenerative diseases of the brain.

2. *Recurrent or non-recurrent*—

*Acute or non-recurrent convulsions*—

| | |
|---|---|
| Intracranial infections | Metabolic disturbances |
| Intracranial hemorrhage | Acute cerebral oedema |
| Toxic | Cerebral thrombosis |
| Anoxic | |

*Chronic or recurrent convulsions*—

| | |
|---|---|
| Febrile convulsions | Cardio-vascular dysfunction |
| Epilepsy | Parasitic disease of brain |
| Hydrocephalus | Intracranial tumors |
| Tetany | Degeneration |
| Hypoglycemic states | Lead poisoning |
| Uremia | Migraine |
| Subdural hematoma | |

3. *Birth injury*—History of previous convulsions and any difficulty experienced by mother or baby in the prenatal period.

4. *Family predisposition*—in idiopathic epilepsy and in febrile convulsions.

5. *Recent immunization procedures*—Convulsions occasionally occur after vaccination against pertussis or smallpox and very exceptionally may be evidence of post-vaccination encephalitis.

(c) Pyrexia—always accompanies these indefinite symptoms of illness May show step-ladder rise, higher in evening At end of 1st week it usually reaches 39 5°C (103°F). Shivering attacks may occur.

(d) Signs of bronchitis common. Epistaxis may occur.

(e) Pulse—relative bradycardia and dicrotic pulse.

2. ADVANCE (2nd week)—in untreated case.

(a) General state—Listlessness and apathy; no headache, prostration.

(b) Abdomen—(a) Spleen becomes palpable at end of first week. Soft and at times tender. (b) Increased abdominal distension and discomfort as intestinal lesions further develop. Pulse ate quickens. B.P. tends to fall. Usually there is diarrhoea

(c) Temperature—high, with slight morning remissions.

(d) Rash—Rose spots on 7th to 10th day. Usually scanty. Any part of body may be involved but periumbilical area is most common. Slightly elevated and fading on pressure. Appear in crops. Fade in 2 to 3 days. Not constant. In grave cases diffuse purpuric skin eruptions may appear.

(e) Stools—Usually typical 'pea-soup'. Constipation however may be troublesome.

3. DECLINE (3rd week)—(a) *Mild case*—Toxemia abates, gradual fall of temperature. (b) *Severe case*—Increased toxemia, intestinal hemorrhage or perforation. In very severe cases patient goes into typhoid state largely due to severe electrolyte imbalance. It is characterised by —marked prostration with tendency to slip to foot of bed, delirium or stupor with half-open eyes (coma vigil), muscular twitchings and picking of bedclothes with incontinence of urine and faeces. Death may result from toxic myocarditis.

4. CONVALESCENCE—In a typical uncomplicated case fever subsides in four weeks. Return of appetite. Tongue cleans Increase in weight. General weakness. Pulse faster, easily quickened by exertion Slight peeling of skin and oedema of feet may occur. Femoral thrombosis chief complication. A persistent infection of the gall bladder or less often of the kidneys results in the carrier state.

*Relapse*—may occur some 10 days after the primary attack especially in those who develop a feeble immunity

**Management:**

A. *Of an attack*—

1. Loosen the child's clothes. Turn the child on one side and keep the airway patent. Prevent tongue biting by placing a mouth gag between the jaws, not made of metal.
2. Take temperature, if there is fever—(a) Cold compresses to head. (b) Eau de Cologne compresses to abdomen. (c) Hot bath or mustard bath "is worth while if only to keep the mother occupied".
3. Sedatives—(a) Chloral hydrate 60 mg. per month of age or 50 mg./kg. body weight in 15 ml. olive oil or 8 ml. water per rectum. (b) Paraldehyde 1 m/year of age IM or rectal or 0.15 ml/kg body weight. (c) Phenobarbitone sodium—8-10 mg/kg IM stat, then 5 mg/kg in divided doses 12-hourly IM for 2-3 days for adequate blood levels, then 5 mg/kg orally once daily. (d) Diazepam—0.25-0.5 mg/kg very slowly IV without dilution. Danger of respiratory depression if bolus is given. Repeated every 20 minutes if necessary. Action within 30 seconds. 6 mg/kg can be given rectally in an emergency. (e) Dilantin sodium—100 mg/kg IV stat, then 5-8 mg/kg/day in two divided doses orally.
4. Lumbar puncture—helps to rule out meningitis.
5. Anaesthesia for uncontrollable convulsions—(a) Inhalation—ether by open drop method. (b) Intravenous—sodium thiopentone 0.01 gm. at one year.

B. *Prevention of recurrence*—

1. Maintain the child in a quiet state and avoid unnecessary handling.
2. Ascertain the primary cause and treat it.
3. Administer sedatives with prolonged action—phenobarbitone 5 mg/kg.
4. Ice cap to head or tepid sponging if pyrexia.
5. Oxygen if asphyxia.

C. *Treatment of special types of convulsions*—

1. Acute infection—Antibiotic and antipyretic therapy.
2. Tetany—2 ml/kg 10% calcium gluconate I.V. Oral maintenance 50 mg/kg elemental calcium (Calcium lactate has 30% elemental calcium).
3. Hydrocephalus—Repeated ventricular punctures or surgical procedures.

4. CIRCULATORY—(a) *Myocarditis*—Mild common, rarely severe enough to cause death. (b) *Phlebitis and arteritis*—Chiefly femoral, popliteal and tibial vessels. Arteritis may result in gangrene, phlebitis in thrombosis with oedema.
5. NERVOUS SYSTEM—(a) Mental state—Delirium sometimes violent, coma vigil, psychoneurosis, mania and melancholia during convalescence. Sometimes Korsakoff's syndrome especially in alcoholic subjects. (b) Meninges—(i) Meningism at onset. (ii) Typhoid meningitis at any stage. (iii) Deafness secondary to suppurative meningitis. (c) Encephalitis with Parkinsonian syndrome. (d) Hemiplegia due to thrombosis. (e) Peripheral neuritis—either of individual nerves, e.g. popliteal, or polyneuritis. Tender toes.
6. HEMPOIETIC SYSTEM—Hemolytic anemia may occur probably related to G6PD deficiency in chloramphenicol treated patients.
7. BONES, JOINTS AND MUSCLES—(a) Arthritis, usually suppurative. (b) Osteomyelitis. (c) "Typhoid spine" or spondylitis occurs usually in adults during convalescence. (d) Painless rupture of large muscles like rectus abdominis and pectoralis major due to Zenker's hyaline degeneration.
8. SKIN AND HAIR—Furunculosis and subcutaneous abscesses. Bed sores. Alopecia occasional sequel, more likely in children. Nails become thin, brittle and lustreless.

**Diagnosis :**

1. *White cell count*—Leucopenia with relative lymphocytosis Absence of eosinophilis.
2. *Blood culture*—positive in 80% of untreated cases.
3. *Stool culture*—frequency of positive culture rises from 2nd week onwards.
4. *Agglutination* (Widal) *test*—positive by 10th day. Maximum about 18 to 23rd day. The titre has no correlation with the severity of illness Significance of Widal's test—(a) *In patients previously inoculated*—(i) A single agglutination test has no value (ii) An attack of enteric fever will stimulate both H and O agglutination, but a rise in H agglutinins can occur in any febrile illness (anemnestic reaction). Hence a significant or rising titre of O agglutinins is evidence of active disease. (b) *In patients not previously inoculated*—Initial titre of 1:40 suggestive of typhoid fever. Rising titres diagnostic. Negative agglutination test does not exclude typhoid fever.

8. *Craniostenosis*—Premature closure of sutures of skull resulting in deformities of head and frequently damage to the brain and eyes—(a) Oxycephaly—premature closure of coronal sutures resulting in tower head. (b) Acrocephaly—sometimes pointing in the region of anterior fontanelle. (c) Scaphocephaly—Skull narrowed from side to side but elongated in anteroposterior diameter due to premature fusion of sagittal suture. (d) Craniofacial dysostosis—acrocephaly, beak-shaped nose, hypoplastic maxilla, exophthalmos, and external strabismus.
9. *Hyperteleorism*—Abnormally large distance between the eyes, and broadening of the roof of the nose due to overdevelopment of lesser wings of sphenoid bone.
10. *Lacunar skull*—Defects in the vault in the form of shallow depressions or deep cavitations extending to the outer surface and occurring mainly in the frontal or parietal areas. X-ray of skull shows irregular patches of rarefaction or lacunas. Often associated with meningocele.

## 22. HYDROCEPHALUS

**Definition:** Hydrocephalus is a condition in which a portion of the entire ventricular system is abnormally dilated and the cerebrospinal fluid is or has been under increased pressure.

**Etiology and classification:**

A. Non-communicating (Intraventricular obstruction)—

1. Maldevelopment of aqueduct—Stenosis, atresia, septum, gliosis.
2. Obstruction due to mass lesions—Neoplasm, cyst, hematoma, aneurysm of vein of Galen.
3. Obstruction secondary to exudate, hemorrhage or parasites.
4. Obstruction of 4th ventricle outlet foramina—Dandy Walker, arachnoiditis.

B. Communicating (Extraventricular obstruction)—

1. Postinfectious, posthemorrhagic or developmental adhesions of basilar cisterns or surface subarachnoid space.
2. Arachnoid villi obstruction by erythrocytes.
3. Communicating hydrocephalus with Arnold-Chiari malformation.

13. *Brucellosis*—An epidemic disease of long duration, characterised by fever, continuous, remittent and intermittent in type, in most cases enlarged spleen, profuse perspiration, listlessness, and almost invariably relapses, accompanied by pains of a rheumatic or neuralgic character, arthralgia or swelling of joints Positive agglutination test

14. *Infectious mononucleosis*—Abrupt onset with sore throat, prolonged pyrexia; the temperature at first remittent may later become intermittent Considerable constitutional disturbance Papular or maculopapular rash chiefly on trunk. Spleen rarely enlarged Late glandular enlargement

15. *Rickettsial infections*—Clinical picture characterised by an acute infectious process lasting 1-3 weeks. Symptoms are high fever, prostration, mental aberrations and a rash developing towards end of first week.

16 *Psittacosis*—History of contact with parrots, pigeons or badgerigars Influenza-like illness with atypical pneumonia Rising titre of antibodies or single high titre to the complement-fixing antigen of Chlamydia group B.

17. *Collagen disease*—e g SLE or polyarteritis nodosa Symptoms and signs referable to multiple organ systems. Weakness and weight loss.

18. *Tularemia*—of "typhoid type" may occur in laboratory workers Sudden onset with headache and fleeting pains; pyrexia may subside to normal or nearly so on 3rd to 6th day. Spleen not palpable Positive agglutination of serum by P. tularense.

## Management:

**I. Specific—**

*Chloramphenicol*—Drug of choice 500 mg. 6-hourly till temperature comes to normal, then 500 mg. 8-hourly until tenth day. An interval of seven days may then be allowed after which Ampicillin 500 mg. q.d.s. or Cotrimoxazole 2 tablets b.d. may be given for 7 days to cover the period of possible relapse When oral administration is not possible, it can be given in doses of 1 gm. intramuscularly every 12 hours For children about half the adult dose, as syrup of stearate or palmitate containing in each 4 ml (one teaspoonful) 125 mg. of chloramphenicol.

*Cotrimoxazole*—If chloramphenicol is not tolerated or for strains of S. typhi resistant to the drug. Each tablet contains trimethoprium 80 mg. and sulphamethoxazole 400 mg. For adults 2 tablets every 6 hours for 10 days. Average duration of fever after starting treatment is 4½ days. Side effects are skin rash and fall in hemoglobin. As with chloramphenicol relapse may occur.

*Ampicillin*—Not so effective, may be used for milder cases Dose 1 gm. 6-hourly until defervescence, followed by 750 mg 6-hourly for 7-10 days.

tion of percentage of dye excretion in the urine at definite times after the injection has additional value in analysing completeness and site of obstruction.

*Lumbar pneumoencephalography or ventriculography*—if non-communicating hydrocephalus.

*Isotope cysternography*—Injection of radio-iodinated serum albumin containing small dose of $^{131}I$ into lumbar theca. In communicating hydrocephalus the isotope can be detected in the ventricles by 24 hours.

COURSE—The great majority of infants in whom a progressive type of hydrocephalus develops early and is not relieved by operation die within several months to a few years. In less severe forms survival to later childhood is possible even without operation. The most common cause of death is intermittent infection and inanition. In a proportion of infants the hydrocephalus becomes arrested as a result of natural compensatory mechanism of rupture of the ventricle into the subarachnoid space.

**Treatment:**

1. *Stationary or arrested type*—as judged by head circumference at weekly intervals, no surgical treatment.
2. *Progressive type*—The site of obstruction must be localised by above tests. Estimate cerebral mantle by introducing spinal puncture needle through coronal suture and note the depth at which fluid begins to flow (after accounting for scalp and skull). If cerebral mantle is less than 1.5 cm. in thickness, prognosis is poor.
3. *Expanding lesion*—Direct surgical attack if possible. For congenital malformation or inflammatory lesion, bypass operation to increase absorption of C.S.F. by diverting it from a ventricle to sites from which it can readily be absorbed. Perhaps the most promising operation for the relief of hydrocephalus is ventriculovenous shunt using the Spitz-Holter valve. This device allows C.S.F. to join the venous circulation without reflux of blood.
4. *Acetazolamide*—10-25 mg/kg orally may aid to decrease CSF production.

## 23. CEREBRAL PALSY

DEFINITION—Non-progressive central motor deficit due to prenatal or perinatal causes.

CAUSES—1. Cerebral anoxia. 2 Trauma to brain at birth. 3. Congenital malformations of the brain. 4. Kernicterus.

(d) *Toxemia*—Hydrocortisone 200 mg. or Dexamethasone 8 mg. parenterally followed by 45 mg. prednisolone in divided doses on 1st day, 30 mg. on 2nd, 15 mg. on 3rd, 10 mg on 4th and 5 mg. on 5th and last day. Only danger is that it may mask the symptoms of intestinal perforation.

(e) *Hemorrhage*—(i) Absolute bed rest. (ii) Nothing by mouth. (iii) Repeated fresh blood transfusion. (iv) Raise foot of bed. (v) Morphia—15 mg. subcutaneously repeated as necessary.

(f) *Perforation*—(i) Slow perforation—Gastric suction and IV fluids. Chloramphenicol and supplemented with penicillin and streptomycin. (ii) Acute perforation—Laparotomy.

(g) *Peripheral failure*—Plasma transfusion, oxygen, vasopressor drugs, intravenous hydrocortisone or dexamethasone.

(h) *Acute cholecystitis*—Gastric aspiration and attention to fluid and electrolyte balance.

IMMUNIZATION—Anti-triple typhoid vaccine containing in each ml. 1,000 million typhoid organisms, 250 million each of paratyphoid "A" and "B" organisms. Course of 3 injections of 0 5 ml., 1 ml. and 1 ml. subcutaneously at intervals of not less than 7 days or not more than 28 days. Immunity lasts for about 12 months. Booster doses of 0.5 ml. subcutaneously or 0.1 ml intradermally. Intradermal injection gives response equal to that obtained by subcutaneous inoculation but without the undesirable local and general reactions of the latter.

## 8. BRUCELLOSIS

**Epidemiology**— *Organism*—Intracellular parasite belonging to the genus brucella. *Transmission*—The infection is acquired by man through consumption of infected unsterilised milk, and its products. In farmers and veterinarians infection from the genital tract discharges of cattle, sheep and goats may be responsible, the route of infection being the skin, conjunctiva or respiratory tract. *Age*—Rare below age of 15, three times more common in men

**Clinical features:**

*Incubation period*—2-4 weeks. (7-10 days following accidental inoculation.)

(e) Post-operative.
(f) Miscellaneous—constipation, septic tonsils, carious teeth, hypersensitivity to the material of the bedding.

3. As a symptom of psychological ill-health and without evidence of organic disease.

**Clinical manifestations:**

1. Bed may be wetted once or several times at night. As a rule child does not awake after bed-wetting.
2. Diurnal enuresis may develop after nocturnal enuresis has continued for sometime.
3. Frequency and urgency to evacuate bladder common, rarely the child is constantly wet with offensive, decomposing urine.
4. In children with irritable bladder, play, exercise, sudden laughing or fright may be followed by evacuation of the bladder.
5. Other nervous traits like habit spasm, stuttering, etc. may be present.

**Management:**

1. *Confidence and training*—Aim is to treat the bed wetter not the bed-wetting. Scolding and punishment should be avoided. Child should empty bladder before going to bed. For some time child may be awakened 2-3 hours after sleep and made to evacuate bladder, and again in the early morning. Restriction of fluid in latter part of day.
2. *Correction of physical defects* and improvement of general health.
3. *Drugs*—may help. (a) *Antispasmodics*—cause muscles in bladder wall to relax and so can increase capacity of bladder, e.g. belladona and ephedrine. (b) *Stimulants*—to lighten sleep so that child wakes up in response to the stimulus of a bladder that is about to empty. (i) Imipramine (Dapsonil)—25-50 mg. each night at 5-7 years increasing to maximum of 75 mg. at age of 10. (ii) Amphetamine—30 mg. gradually increased to 60 mg. before bed time. (c) *Drugs to reduce urine volume*—Desmopressin inhalation, stimulates and acts like antidiuretic hormone.
4. *Electric alarm*—(*buzzer*)—when the child passes urine a bell rings due to damping of a special conductor pad applied to the perineum and the child gets up This is often effective in correcting what has become a physiological bad habit.

the skin (tattoo or hypodermic needle) suspicion points to droplet infection, the source of infection being an individual harbouring viable organisms in the mucosa of the upper respiratory tract, probably the nose. Although a larger percentage have mycobacteria in their skin, it is doubtful if skin-to-skin contact is important in the spread of leprosy as organisms in the dermis are separated from the epidermis by a mycobacteria-free zone. Proof of high degree of resistance to leprosy among adults are the low incidence of infection acquired from a marriage partner and the failure of attempts to infect volunteers Vast majority of infections are acquired in childhood Congenital transmission does not occur.

*Immunology*—The pattern of disease depends upon the type and extent of immune response. When cell-mediated immunity is strong, the pattern is tuberculoid It is limited to one or few well defined sites and bacilli are difficult to find. Antibodies are usually not detected. When cell-mediated immunity is not expressed, the resulting pattern is lepromatous. Clinically the infection is widespread and there are numerous bacilli in the organs involved. Antibodies are present in high titre. In between these two types lies the borderline or dimorphous leprosy.

*Incubation period*—2 to 7 years.

**Clinical features:**

*Indeterminate lesion*—The earliest manifestation of leprosy is a small slightly hyperpigmented macule occurring anywhere on the body. Majority of these lesions heal spontaneously.

*Determinate lesions*—that cause clinical disease may arise spontaneously or out of indeterminate lesions and can be predominantly tuberculoid or lepromatous.

**Clinical features:**

1. **Tuberculoid leprosy—**

   (a) *Nerve lesions*—The patient complains of sensory and/or motor symptoms depending on the type of nerve involved. Usually one single nerve is affected, or two at most, the greatest enlargement being where the nerve is most superficial, e g, great auricular nerve in the neck, ulnar nerve above the medial condyle, radial cutaneous nerve at the wrist, median nerve at the carpal tunnel, sural and superficial peroneal nerves in lower leg, posterior tibial nerve behind lateral malleolus, sensory nerves of thigh and forearm and two

sometimes induces a febrile disturbance or a mild measles-like illness which is non-infectious.

1½ YEARS—DPT. Oral polio vaccine.

5 YEARS—DPT, Oral polio vaccine.

8 YEARS—dT.

PRECAUTIONS AND CONTRAINDICATIONS TO IMMUNISATION—

(a) Antigens should not be given in the presence of respiratory or other infections. (b) Antigens should be injected deep subcutaneously or intramuscularly. (c) Elective immunization should not be made during outbreak of poliomyelitis. (d) A history of frequent repeated convulsions with possibility of epilepsy would contraindicate giving of pertussis vaccine in combined prophylaxis. (e) History of personal or family allergy exemplified by infantile eczema is not a contraindication unless the first dose of combined vaccine produced an exacerbation. In such an instance it is advisable to give the antigens separately; if a further reaction occurs after a particular antigen, its use should be discontinued. (f) Vaccination should not be done in the presence of eczema or skin infection, and the site of vaccination should be covered lightly, if at all.

BCG VACCINATION :

*Indications*—(i) Tuberculin negative persons at any age. It is quite safe to vaccinate newly-born babies. They react with as high a percentage of positive results as adults. (ii) Non-reactors in homes where there are tuberculous patients. (iii) Persons constantly exposed to infection such as medical students, nurses, hospital and sanatoria personnel. (iv) School children. (v) All Mantoux-negative young adults.

*Method*—Intradermal injection of 0.1 ml. of freeze-dried BCG vaccine with disposable or heat-sterilised syringe and needle or dermojet usually into the skin over the left deltoid. About a week after the injection the local reaction starts as a small red papule which develops into a vesicle and breaks down into a small sore over the next few weeks. Use of the vaccine causes long-lasting or permanent conversion of the tuberculin reaction from negative to positive in almost all cases.

*Ill-effects*—rare. (i) Occurrence of abnormally large sore or local abscess which can be treated by local application of isoniazid and PAS powder, or of neomycin. (ii) Very rarely disseminated tuberculosis, often in infants and children with pre-existing immunological defects. (iii) Large axillary lymphadenopathy may require anti-Koch's treatment.

fest before skin lesions appear, and it is polyneuritic. Skin lesions may take the form of macules, plaques, annular lesions or bizarre-shaped bands. Plaques with a 'punched out' appearance are characteristic. (b) *Borderline tuberculoid*—Lesions are fewer and drier, have more hair loss and anhidrosis. Some degree of sensory involvement can be demonstrated in the lesions and several nerves are thickened.

MID-BORDERLINE LEPROSY—This form is immunologically unstable and clinically rare. If a patient with untreated tuberculoid leprosy loses resistance, bacillary multiplication increases and the disease becomes borderline lepromatous Clinical features are a mixture of two types; nerve damage is usually extensive

LEPRA REACTIONS—These are not drug reactions but are more likely to complicate chemotherapy—(a) *Type 1 lepra reaction*—can occur in any type of leprosy and is characterised by swelling and redness of skin lesions accompanied by pain and swelling in one or more nerves. Oedema of face, hands and feet often occur. Skin lesions may break down, and nerve damage from cellular reaction and oedema may lead to facial palsy, claw hand, or footdrop. (b) *Type 2 lepra reaction* (*Erythema nodosum leprosum reaction*)—An antigen-antibody reaction encountered only in lepromatous leprosy. Characterised by transient erythematous nodes and patches occurring in crops in any part of the skin but particularly on face, arms and thighs, usually fading in a few days and being replaced by fresh lesions, but sometimes becoming necrotic and ulcerating. Other manifestations include fever, neuritis, swollen joints, painful tibiae, swelling and tenderness of one or more lymph glands, epistaxis, epididymoorchitis, iridocyclitis, and proteinuria This type of reaction can be precipitated by intercurrent infection, mental and physical stress, vaccination of various types, injury, surgical operation, and by over-enthusiastic chemotherapy.

**Diagnosis**: *Mutibacillary disease* (lepromatous or borderline lepromatous)—Bacilli can be readily demonstrated in skin lesions and other commonly affected sites such as ear lobes by slit-skin smear. The number of bacilli seen are estimated as the *bacillary index*, which is useful for classification. The percentage of bacilli staining homogenously—*morphological index*, is useful in assessing response to treatment.

*Paucibacillary disease* (tuberculoid and borderline tuberculoid)—Bacilli are difficult to detect and diagnosis is usually clinical (anaesthetic skin lesion and enlarged nerve), and can be confirmed histologically.

3. *Hypomanic*—always happy and cheerful, happy-go-lucky type, witty and jovial, extroverted.
4. *Hysterical*—exhibitionist and dramatizing, attention seeking, immature, highly suggestible.
5. *Inadequate*—shunting the responsibilities, diffident.
6. *Melancholic*—depressed and sad, pessimistic outlook and philosophy.
7. *Obsessive*—rigid in habits and outlook, perfectionist, conscientious fond of cleanliness, regularity and punctuality.
8. *Paranoid*—extremely suspicious 'doubters".
9. *Psychopathic*—antisocial traits like lying, stealing, etc., nonconformist, not observing the codes of mortality, ethics, culture, etc., very little feelings of shame and guilt, cannot evolve stable emotional relationship.
10. *Schizoid*—shy, reserved, asocial, poor mixers, have very few friends, introverted.

Knowledge of individual's personality helps in—(1) Understanding behaviour of normal persons. (2) Diagnosing the patient's illnesses. (3) Predicting the prognosis. (4) Rehabilitating the patient after recovery from illness.

**Causes of mental illnesses:** No one single factor held responsible. Multiple factors are incriminated but precise role not conclusively proved. Common ones are: (1) Constitution and physique. (2) Heredity. (3) Physiological changes in the body at puberty, menstruation, involution, senescence, etc. (4) General cerebral dysfunction. (5) Trauma, particularly head injury. (6) Infection—acute, subacute and chronic. (7) Biochemical, Metabolic and Endocrine disturbances. (8) Dehydration and Deficiency states. (9) Drugs, chemicals and heavy metals. (10) Alcohol. (11) Physical defects and Physical illnesses. (12) Social and cultural environment. (13) Problems about marriage, pregnancy and child-birth. (14) Difficulties in occupation and finance. (15) Psychological factors like strained interpersonal relationship (at home, place of work, school, college, etc.,), bereavement, loss of prestige, job, etc. (16) Unhealthy physical environment such as overcrowding, slums, etc.

DEVELOPMENT OF MENTAL ILLNESS: Various theories postulated. No single explanation accepted. Everybody agrees on the interaction of predisposing factors and precipitating factors resulting in mental illness.

*Predisposing factors:* (a) Biological—like heredity, constitution, endocrine, metabolic and biochemical abnormalities and

sites associated with arthropods in their natural life cycle and usually transmitted to man by arthropods. The rickettsial disease could be anti-genically divided into typhus, spotted fever and scrub typhus.

I. **Typhus infections:**

1 LOUSE BORNE OR EPIDEMIC TYPHUS—Caused by R. Prowazeki and transmitted from man to man by human body louse.

*Incubation period*—10-14 days.

(a) *Stage of invasion*—Abrupt onset with rigors and fever; severe headache; muscular pains and conjunctival injection. Active delirium may be present, insomnia common; severe attack may commence with vomiting, rigor or convulsion. Temperature is high at onset, rises steadily to maximum on 5th day.

(b) *Stage of eruption and nervous excitement*—(i) Rash—usually on 5th day. Pink macules varying in size and shape, disappearing on pressure. Generalised but face rarely involved. In a day or two lesions become dull red and finally slate blue or grey before disappearing. Petechiae may occur. Following eruption of macules, paler subcuticular lesions appear between the macules—subcuticular mottling or mulberry rash. (ii) Temperature—high till the 6th day. (iii) Delirium—replaces headache and stupor. Mostly at night. (iv) Spleen may be palpable.

(c) *Stage of prostration*—Patient appears exhausted and stuporose, this may progress to delirium or coma as in typhoid. Hypotension may result from myocarditis and peripheral vasodilatation. Features of grave prognostic significance include progressive fall of B P., gangrene of fingers or toes, pressure areas and genitalia, urinary and faecal incontinence, renal failure and secondary infection.

(d) *Stage of defervescence*—In favourable cases about the 12th or 14th day striking improvement occurs Patient becomes quieter. Fever becomes remittent and drops to normal in a few days.

*Complications*—(i) Bronchopneumonia (ii) Myocarditis (iii) Thromboembolic complications (iv) Peripheral failure (v) Suppurative parotitis. (vi) Gangrene of areas of skin

2. BRILL-ZINSSER DISEASE—is a recrudescent form of epidemic typhus. Intense frontal headache and low B.P. are prominent features.

(e) Personal history—regarding information about stressful situations during childhood, adolescence, school and college life; occupational, social, marital and psychological difficulties.

(f) Clinical assessment of dominant personality traits.

2. Psychiatric examination—to detect disturbances of mental function such as thinking, emotion, behaviour, orientation, perception, memory, intelligence, insight, etc.

3. Physical examination—particularly of the nervous system.

4. Investigations—

(a) *Laboratory investigations*—Blood, urine, stool examination, radiological studies, ECG, liver and kidney function tests, etc.

(b) *Special investigations*—

(i) Social or environmental investigations done by the Psychiatric Social Worker.

(ii) Psychological investigations done by the Clinical Psychologist.

(iii) Observations by the Occupational Therapist are sometimes necessary to get an objective evaluation of the (a) patient's mental state, particularly behaviour, and (b) progress in the recovery of the patient undergoing treatment.

(iv) Observations by the psychiatric nurse of the patient's ward behaviour.

Social and Psychological Investigations :

Social investigations are carried out by the Psychiatric Social Worker through interviews with the patient, relatives, friends and employers, held either in the hospital or by paying a visit to home or the place of work.

The aim is to study the mileu or the environment in which the patient has lived before becoming sick. An attempt is made to understand the role of various factors like cultural and religious background, family and social relationship, childhood experiences, school and college life, occupational adjustments, financial problems, marital and sexual difficulties, etc., in the development of the individual's personality and his illness.

Psychological investigations are done by the clinical psychologist with the help of standardised tests. The types of mental tests used are—

1. Intelligence tests (Verbal and non-verbal or performance tests) to assess intelligence. The commonly used tests are

5. *Rickettsial isolation in animals*—Patient's blood during first week of fever is injected intraperitoneally into male guniea pigs, mice or voles. Characteristic scrotal inflammation results.

**Treatment**—chloramphenicol or tetracycline initial dose 50 mg/kg or 25 mg/kg body weight; subsequent daily dose same but divided equally for administration every 6-8 hours for 5-7 days or until patient is afebrile for 24 hours. Doxycycline 100 mg in a single dose effective for scrub typhus.

*Immunization*—Vaccine consisting of a killed suspension of Rickettsia prowazeki cultured in yolk sac. Course of two injections of 1 ml each at 7-10 day intervals Immunity relative, lasting for 6-8 months. Booster injection of 0 5 ml. every year.

## 11. RABIES

**Definition**—Rabies is an infective disease caused by RNA-containing virus of the Rhabdoviridae family. It is primarily a zoonosis but is occasionally transmitted to man by animal bites, resulting in an encephalomyelitis which is nearly always fatal

**Epidemiology**—An infective disease due to a filtrable neurotropic virus transmitted by the bite of an infected dog or the licking of a freshly abraded surface by the animal. Epidemiologically two types—(i) Occurring in wild life and maintained by mammals such as wolves, mongooses, foxes and jackals, and by bats. (ii) Urban type—in which the dog mainly is responsible though during epidemics other domestic animals such as the cat and cattle may be infected.

*Incubation period*—Varies from 20 days to 90 days in majority. Varies with—(i) Age—shorter in children. (ii) Site of infection—Face about 30 days, hands 40 days, legs 60 days. (iii) Severity of wound. (iv) Animal—shorter period in order—wolf, cat, dog.

**Clinical features:**

*Prodromal symptoms*—Pain and irritation or discomfort at site of bite, fear and anxiety, depression, intolerance to loud sounds Periods of irritability. Hoarseness of voice and sense of constriction in throat with difficulty in swallowing. Slight rise of temperature. Duration 1-2 days Subsequently, symptoms of either furious or paralytic rabies develop, depending on whether the spinal cord or brain are predominantly infected.

FURIOUS RABIES—(a) *Hydrophobia*—a combination of inspiratory muscle spasm, with or without painful laryngopharyngeal

**Types:** (a) Organic, and (b) Functional.

*Differences between Organic and Functional psychosis:*

| *Organic* | *Functional* |
|---|---|
| 1 Caused by or associated with impairment of brain tissue function; evidence for systemic diseases involving brain, liver, kidney, endocrine glands, etc present | 1 Caused by psychogenic factors, no clearly defined systemic cause or structural change in brain or other viscera. |
| 2. Disturbances of consciousness common. | 2 Disturbances of consciousness rare. |
| 3. Disturbances of orientation, memory and intelligence present | 3 Disturbances of orientation, memory and intelligence absent (Pseudo disturbances which arise because of patient's non-co-operation and lack of attention or interest may be present). |
| 4 Disturbances of perception viz. hallucinations are of visual variety. | 4 Disturbances of perception viz. hallucinations are of auditory variety. |
| 5 Disturbance of emotions is usually of the "labile" type i e. patient fails to hold back emotional expressions — "emotional incontinence". | 5. Emotional incontinence is rare. |
| 6 Confabulation common | 6 Confabulation rare |
| 7 Deterioration of personal and social habits common. | 7. Deterioration of personal and social habits uncommon. |
| 8. Physical examination of the patient reveals clinical features of systemic diseases | 8 Physical examination of the patient usually reveals no abnormality which can explain the mental symptom. |
| 9. Psychological tests like Bender Gestalt test positive. Marked difference between verbal and non-verbal tests of intelligence. | 9. Bender Gestalt test negative. No marked difference between verbal and non-verbal tests of intelligence. |
| 10 Laboratory and radiological investigations as well as electroencephalography help in determining the etiological factors responsible for the psychosis. | 10 Laboratory and radiological investigations as well as electroencephalogram reveal no specific abnormality |

(iii) Broken skin is soiled with the saliva of a rabid animal. (iv) Dog has disappeared or been killed without diagnosis of rabies being established and rabies is known to be present in the area. (v) Bite on face or head.

*Types*—(i) Nervous tissue vaccine 5 ml. of 5% suspension of carbolised anti-rabic vaccine subcutaneously in abdominal wall for 14 days in ordinary cases, and 21 days in severe exposures. Complications—Erythema, oedema, pruritus and pain at site of inoculation. Sometimes severe and accompanied by fever, glandular swellings; may be followed by encephalitis and paralysis. (ii) Human diploid cell strain vaccine (HDCSV) induces excellent antibody levels and no risk of neuroparalytic complications. Dose—1.0 ml IM on days 0, 3, 7, 14, 30 and 90.

(b) PASSIVE IMMUNISATION—

(i) *Antirabies serum* (ARS)—in severely bitten cases which are expected to have a short incubation period —(a) Bites on face, neck, shoulder, arms. (b) Multiple bites, severe deep lacerated wounds caused by bites, wolf or jackal bites on any part of body even when not considered severe. The aim is to tide the patient over till such time as active immunity is developed in response to vaccine. A single injection of 0.5 ml. (40 I.U.) per kg. body weight confers good passive immunity and is given on the first day followed by vaccine. Since anti-serum interferes with antigenicity of vaccine in some cases, additional doses of vaccine should be given as single booster dose at 10 and 20 or more days after the last daily dose.

(ii) *Human rabies immune globulin* (HRIG)—No hypersensitivity reactions as with ARS. Dose—20 IU/kg body weight. Half is given IM (at a different site from the vaccine) and half is infiltrated round the bite wound. The only disadvantage of passive immunisation is that it partly suppresses the response to vaccine, but this can be overcome by giving doses of vaccine on days 30 and 90.

PRE-EXPOSURE VACCINATION—in those who work with rabies virus in laboratories, vets, animal handlers, forest rangers, cave explorers, naturalists Dose—Two intradermal injections of 0.1 ml (or IM doses of 1 0 ml)

**Investigations:**

(a) *Laboratory*: Examination of blood, urine, liver function tests, etc. mainly to confirm the clinical diagnosis about systemic diseases.

(b) *Psychological*: 1. Bender Gestalt test consists of asking the patient to copy eight geometrical figures. Patients suffering from organic psychosis fail to draw all the figures correctly.

2 Verbal and non-verbal tests of intelligence. In normal persons, the difference between the score on the two tests is less than 10 points. In patients suffering from organic psychosis, the score on non-verbal intelligence test is lower than the score on verbal intelligence test by more than 10 points.

3. Tests for Memory for digits in straight order and reverse order: Patients suffering from organic psychosis show a narrowing of the memory span.

(c) *Others*: 1. Fundus examination. 2 X-ray skull. 3. Electro-encephalography. 4. Blood W.R. and/or V.D R L. 5. C.S.F.—routine, W.R. and Colloidal Gold Curve. 6. Pneumo-encephalography. 7. Ventriculography. 8. Angiography. 9. Brain scan. 10. Brain biopsy.

**Types of Organic psychosis:**

(A) *Acute* (Acute brain disorders or toxic confusional psychosis)—rapid onset, alterations in the states of consciousness marked, patient often bewildered, disoriented, excited and agitated, hallucinations present, visual more common than auditory. Usually reversible, may prove fatal if not attended to promptly and energetically. Patient may recover without any residual defect or may progress into the chronic type, e.g. psychosis associated with alcohol (delirium tremens), meningitis, head injury, etc.

(B) *Chronic* (Chronic brain disorders)—gradual onset, alterations in the state of consciousness not marked. Patient disoriented. Memory disturbances present. Intellectual deterioration evident Confabulation and circumstantiality observed. Usually irreversible but non-fatal. Deterioration in the mental functions common Examples: psychosis associated with diseases of the brain like syphilis (G.P.I.), chronic consumption of alcohol (Korsakoff's syndrome), arteriosclerosis, senility, etc.

**Etiology:** Exact mechanism of the symptom formation not clearly understood. Several causes may be responsible—

4. STAGE OF CONVALESCENCE—Fever subsides by 6th or 7th day, pains diminish and gradually disappear. Joint pains and other sequelae may persist and cause protracted convalescence.

*Diagnosis*: 1. Virus isolation by tissue culture of serum obtained during first days of illness. 2. Serological tests—Hemagglutination inhibition and complement fixation tests.

*Complications*—Hyperpyrexia, hemorrhage, diarrhoea, orchitis, and albuminuria.

*Sequelae*—Acute depression or melancholia, joint pains, and tendency to syncope.

*Management*—is entirely symptomatic.

## 13. RAT-BITE FEVER

**Etiology**—*Organism*—Spirillum minus and Streptobacillus moniliformis. *Transmission*—Either of these infections in man may result from the bite of a rat but S. moniliformis infection may be acquired by swallowing material containing the organism e g. milk or infected food.

*Incubation period*—Average 2 weeks.

**Clinical features:**

1. *Onset*—Sudden with often rigor, headache, high fever, pains in joints and muscles.
2. *Rat bite wound*—Local response of allergic type with redness, swelling and oedema at site of bite with increase of discharge if not healed. Regional lymphangitis and lymphadenitis.
3. *Rash*—Dark purplish macular or maculo-papular eruption over arms, legs, trunk and sometimes face. Rarely mucous membranes May be absent Rash fades during febrile periods and may reappear during relapses.
4. *Fever*—High remittent temperature for 4 to 5 days falling to normal with profuse sweats and subsidence of primary lesion. Recurrence of fever in few days but duration shorter Such relapsing type of fever may continue for weeks or months in untreated cases. Usually paroxysms become less in height and duration and infection eventually subsides spontaneously.
5. *Other symptoms*—Muscle and joint pains. Arthritis, delirium and rarely coma.

mg. t d.s. (Neuroleptics can be given by intramuscular injection also). Piracetam 800 to 1600 mg. t.d.s. is claimed to be useful in hastening recovery particularly in early cases.

3. Treat the cause whenever possible.
4. Massive vitamin therapy particularly with vitamin $B_1$, $B_6$ and $B_{12}$.
5. E.C.T. if the drugs fail to control the excitement.
6. Occupational therapy, recreation therapy and suitable rehabilitation with the help of psychiatric social worker.

## FUNCTIONAL PSYCHOSIS

**Definition:** This is a group of mental illnesses where the symptoms of psychosis are present, even though there is no demonstrable structural disturbance of brain tissue. The clinical manifestations of functional psychosis differ from those of organic psychosis by the absence of disturbances of memory, intelligence, orientation and consciousness.

There are four well recognised types of functional psychosis: (i) Schizophrenia. (ii) Depression. (iii) Mania. (iv) Involutional psychosis. According to some, there is a fifth group known as paranoid states consisting of paranoia, and paraphrenia but others like to consider them as a variation of a type of schizophrenia viz. paranoid schizophrenia.

### I. Schizophrenia

Kraepelin in 1896 recognised this form of illness and coined the term "Dementia Precox" (premature deterioration of mental faculties). Bleuler in 1911 introduced the term schizophrenia (splitting of mind) to identify the same illness.

**Definition:** Schizophrenia refers to a group of mental illnesses characterised by specific psychological symptoms leading to a disorganization of the personality of an individual. The symptoms chiefly interfere with the patient's thinking, emotions and behaviour in a characteristic way.

**Etiology:** Not clearly known. Probably several factors contribute to the development of illness.

1. Heredity: The incidence of schizophrenia is very high (86%) in uniovular twins. Relatives of schizophrenic patients suffer from the disease commonly. The transmission is probably through one or two autosomal recessive genes.

or indirectly from contaminated water or soil. *Routes of infection*—Infection commonly takes place by way of moist or abraded skin, mucous membranes and the conjunctivae. *Individuals at risk*—include sewer workers, abbatoir workers, coal miners, farmers, fish workers and those employed on canals, docks and river drainage. Infection via conjuctiva follows swimming or accidental immersion in contaminated water. In the home pet dogs can transfer the disease to children and adults through infected urine. Laboratory workers are at risk from handling animals.

**Clinical picture:**

*Incubation period*—10 days.

*Primary* (leptospiraemic) *stage*: Fever, headache and joint pains simulate influenza and leptospirae appear in blood and CSF. This stage lasts for 4 to 7 days followed within 48 hours by—*Immune stage*: A secondary rise of temperature is accompanied by signs of meningeal irritation; lumbar puncture reveals lymphocytic meningitis.

ICTEROHEMORRHAGIAE INFECTION (WEIL'S DISEASE)—Severe infection is characterised by fever, jaundice and hepatorenal failure. Hematemesis, melena, subconjunctival hemorrhages (pink eyes), petechiae and bleeding from mucous membranes are common. Mortality is high. Mild icteric and anicteric cases may occur. Polymorphonuclear leucocytosis, albuminuria and high blood urea.

CANICOLA FEVER—Characteristic clinical signs are severe headache, conjunctival injection and meningitis.

**Laboratory diagnosis**—(a) *Culture*—Positive culture can be obtained from blood in first week and urine in third week. (b) *Serology*—Rising antibody titre from second week onwards.

**Treatment**—Penicillin 2 mega units IM daily for 7 days in mild cases, 6-10 mega units initially, followed by 3 mega units daily in severe cases. Renal dialysis in presence of renal failure in Weil's disease.

## 15. RELAPSING FEVER

**Etiology:** *Causative organism*—Spirochetes of the genus *Borrelia Transmission*—Transmitted to man by lice (B. recurrentis) or ticks (many strains).

*Incubation period*—about 7 days.

same time. The patient appears absurd and bizzare. He finds difficulty in expressing his emotions and loses his faculty of experiencing feelings. Sometimes the patient develops meaningless concerns about problems of religion, philosophy, science, sex, power, morality, etc. The symptoms can be grouped under following headings—

1. *Disturbances of thinking*—These are diagnostic of the illness and can be in—(a) Stream e.g. incoherence or absence of link between ideas, crowding of ideas, poverty of ideas, thought blocks, thought withdrawal, flight of ideas, etc. (b) Content e g. irrelevant and meaningless ideas, inability to focus on the main point of argument or statement (circumstantiality), pseudophilosophical, pseudoreligious, and pseudoscientific ideas, giving new meanings to words or coining new words (neologism), words linked without meaning (word salad). Delusions (i.e. false belief which cannot be corrected by any amount of reasoning) of various types like somatic, grandiose, paranoid, persecutory, etc. are also commonly seen. Primary delusions i.e. delusion, which does not arise from any antecedent emotional state and which appears without reason or occasion is pathognomonic. Difficulty in concentration and "emptiness" or blankness of mind are also complained of by some patients.

2. *Disturbances of emotions*—Emotional blunting or shallowness of affect i.e. diminished intensity of emotional experience, loss of empathy (apathy), inappropriate or incongruous affects i.e. the patient laughs when he is expected to cry and cries when he is expected to laugh. Hypersensitiveness or insensitiveness of feelings. Ambivalence i.e. simultaneous experience of two opposite types of feelings.

3. *Disturbances of behaviour*—Irrelevant and inappropriate behaviour. Awkward and eccentric actions. Rowdy, violent, abusive, assaultive and destructive behaviour, agitation. Bizzareness in behaviour. Suicidal and homicidal tendencies and attempts. Criminal and sexual overactivity and perversions.

4. *Disturbances of volition or will*—Blunting of will power (anergia), reduction of drive and desire to carry out routines, avoiding mixing in family and friends (aloofness). Inability to make decisions. Reduced efficiency and activity. Feelings of passivity e.g. patient complains that his mind and thoughts are controlled by some outside forces etc.

of Herxheimer reaction. Tick-borne disease—Tetracycline or chloramphenicol 0.5 g q.d.s. for 5-10 days or Doxycycline 100 mg b.d. for 5-10 days.

## 16. WORM INFECTIONS

### FILARIASIS

**Etiology :** *Species of filaria*—Filariasis in man occurs as a result of infection with small-tissue-dwelling roundworms, the best known being the mosquito transmitted Wuchereria bancrofti, the adults of which inhabit the lymphatic tissues. The human reservoir is infective to mosquitoes during inflammatory and early obstructive stages. Patients with advanced filariasis are non-infective. *Periodicity of microfilariae*—In most endemic areas the microfilariae of W. bancrofti appear in greatest numbers in peripheral blood in the night between 10 p.m. and 2 a.m., during the day they return to the pulmonary capillaries Microfilariae of B. malayi exhibit either nocturnal periodicity or diurnal periodicity with a peak in the early evenings.

LIFE CYCLE—Adult female worms situated in various tissues in the human host produce embryonic microfilariae which are sucked up by mosquitoes or biting flies during a blood meal. Microfilariae develop to their larval stage in the insect vector and are passed on to a new human host in which the final maturation to adult worms takes place Adult filarial worms do not multiply in man.

**Clinical manifestations :**

1. *Filarial fever*—Usually high fever with rigors, or mild fever with no rigors. Nausea and vomiting common during attack. After few days fever disappears but further brief attacks of fever may occur followed by remission until acute inflammatory local reactions appear.

2. *Early inflammatory phase*—(a) *Acute lymphangitis*—in extremities common with fever with rigors and toxemia. The tender inflamed lymphatics are seen as red streaks. It may be accompanied by itchy, irregular erythematous swelling of the skin scattered over the body, which may sometimes appear in absence of local lymphangitis. Lymphatics any where in the body may be involved, those of spermatic cord and testis are especially susceptible (b) *Lymphadenitis*—in association with lymphangitis. Glands swollen, firm and tender. Most commonly in groins, also

2. *Hebephrenic schizophrenia*—occurs around the age of 20 to 25 years, acute or subacute onset. Thinking disturbances most marked. Regression, childish behaviour, inappropriate affect, somatic delusions, unpredictable gigling, silliness and hallucinations are additional symptoms. Prognosis not good.

3. *Catatonic schizophrenia*—occurs around the age of 20 to 25 years, incidence perhaps equal in both sexes, acute or gradual onset Symptoms of catatonia most marked. Disturbances of thinking, affect, behaviour and autism are additional symptoms. Delusions and hallucinations are uncommon. Prognosis good.

4. *Paranoid schizophrenia*—occurs around the age of 25 to 30 years, incidence is perhaps more in males than females. Delusions of suspiciousness (Paranoid), persecution and grandeur are the characteristic symptoms. Disorganization of speech and thought and hallucinations are additional symptoms Personality comparatively well preserved and autism and regression are rare. Prognosis good.

5. *Undifferentiated and mixed schizophrenia*—The various symptoms of schizophrenia cannot be grouped into any one of the above types. (a) Acute. (b) Chronic.

B. ATYPICAL—

1. *Childhood and Juvenile schizophrenia*—Schizophrenia, though not common, is seen in children between the ages of 5 years to 10 years (childhood) and 12 to 13 years (Juvenile). Onset may be acute or gradual. Prognosis not good.

2. *Late schizophrenia*—When the symptoms of schizophrenia are seen for the first time around the age of 40 years, it is called late schizophrenia.

3. *Schizoaffective psychosis*—When symptoms of schizophrenia are associated with symptoms of depression or mania, the label used is schizoaffective psychosis. Prognosis is better than that of pure schizophrenia.

4. *Pseudoneurotic schizophrenia*—When the core of the illness is schizophrenia but the presenting symptoms are suggestive of a neurotic illness like anxiety state, phobic reaction, obsessive compulsive neurosis or hysteria, the syndrome is called Pseudoneurotic schizophrenia. The response to the treatment of neurotic illness with psychotherapy, abreactive therapies and/or drugs is not satisfactory and a careful psychiatric examination done through repeated interviews reveals the true nature of the illness.

**Prognosis:** This is determined by following factors—1. Duration of illness: shorter duration carries better prognosis. 2. Type

ointment if ulcers. (b) Chemotherapy or antibiotics—Sulpha, or penicillin or erythromycin during acute attack. (c) Eradication of septic focus.

3. *Relief of lymphatic obstruction*—(a) Surgical treatment for re-establishment of lymphatic drainage may help or (b) bandaging the limb tightly preferably after a period of rest and elevation, massage, and exercise.
4. *Palliative treatment*—
   (a) *Acute lymphángitis*—Rest, elevation of limb, hot fomentations, infra-red rays or short wave diathermy. Aspirin for relief of pain. Penicillin or broad spectrum antibiotics to control infection. Oxyphenylbutazone.
   (b) *Chyluria*—Complete rest. Omit fat from diet. Saline purge. Bladder wash if clots.
   (c) *Elephantiasis*—(i) Use of crepe bandage or elastic stockings in early cases combined with periods of rest in which the leg is held in a horizontal position. (ii) In advanced cases surgical removal of the elephantoid tissue followed by extensive skin grafting to restore mobility to the patient.

## INTESTINAL HELMINTHS

**Hookworm**—Hookworms are nematodes belonging to the family Ancylostomidae. Human infection is caused by Ancylostoma duodenale and Necator americanus which complete their life cycle in man. Transmission of hookworm infection may occur wherever faeces are allowed to remain in contact with damp soil at a suitable temperature. Infection is highest in early adult life.

Life cycle—The adult worms attach themselves by their mouths to the intestinal mucosa and feed upon blood. The gravid male lays eggs which are passed in the stools. In suitable conditions a larval worm hatches in about 24 hours and takes a week to reach the stage infective to man. These infective larvae can penetrate human skin. Having entered the body the larval worms pass in the blood stream to the lung capillaries They enter the alveoli, pass up the air passages and down the oesophagus to reach the jejunum where they attach to the mucosa and mature.

Clinical features :

1. *Skin*—At the point of entry, usually the toes or inner side of sole of foot, the larvae cause a dermatitis known as

excitement or violent behaviour of the patient. (c) Associated symptoms of depression or mania. (d) Suicidal and homicidal tendencies. (e) Patients not responding to the other treatments

3. *Psychotherapy and Case work*—Supportive or superficial psychotherapy indicated in (a) early schizophrenics, (b) maintenance and rehabilitation of recovered patients. Analytical or deep psychotherapy is usually avoided in schizophrenic patients. Case work by psychiatric social worker is quite useful in (i) modifying the environment (physical as well as psychological) so as to make it less stressful for the patient, (ii) establishing harmonious relationship with people around i e. family, friends, relatives, people at work etc, (iii) rehabilitating the recovered patient.

4. *Insulin therapy*—Subcoma therapy consists of 20 to 30 sessions spread out over 3 to 4 weeks. Indications: (a) Paranoid schizophrenia. (b) Debilitated and emaciated schizophrenics. (c) Patients not responding to other treatments Insulin coma therapy is indicated for chronic and refractory schizophrenics.

5. *Occupational therapy, work therapy, art therapy, music therapy, recreational therapy, etc*—are therapeutic adjuvants, by themselves not very useful but play a complementary role to other treatments.

6. *Psychosurgery*—Prefrontal leucotomy. Reserved for only chronic and refractory patients, just to put them into more manageable states.

## II. Depression

**Definition**—This illness is popularly known as Melancholia and is characterised by a triad of—(1) Sadness of mood, (2) poverty of ideas and (3) psychomotor retardation or agitation. Some feel that a fourth symptom viz feelings of guilt must be also present before the diagnosis of depression can be established. Rough estimates suggest that at least 40 to 50% of the patients treated by general practitioners and internists for various somatic complaints have Depression at the core of the illness (masked depression).

**Etiology:** No one single factor held responsible.

1. Heredity: Incidence of depression, cyclothymic temperament, and suicide is high in the family of the patients suffering from this illness. Exact mode of transmission not known. In the case of manic depressive Psychosis probably it is autosomal dominant gene which carries the illness from parents to children.

vertigo and transient syncope. Rarely TCE stimulates ascaris to migrate 'en masse' and may cause intestinal obstruction especially in children. In mixed infection of ascaris and hookworm, therefore, ascaris must be treated first.

*Pyrantel embonate*—more active against A. duodenale Like bephenium also active against ascaris. Single dose of 20 mg./kg.

*Mebendazole*—equally effective against both species. Dose 100 mg. by mouth twice daily for 3 days.

**Roundworm** (Ascaris lumbricoides)—Commonest intestinal nematodes.

LIFE CYCLE—The eggs leave the body in the faeces. At this stage they consist of unsegmented ova protected by a thick shell, which in suitable conditions will develop into larval worms in 2 or 3 weeks. Man acquires the infection by swallowing the larvae, usually on contaminated food. The larvae hatch in the intestine, penetrate the wall, enter the blood stream and pass to the lungs. Here they leave the capillaries and enter the alveoli where they remain for about 10 days. They then pass up the air passages, down the oesophagus to the intestine where they grow to maturity.

CLINICAL PICTURE—depends on intensity of infection, the larval and adult phases being associated with different clinical manifestations.

*Larval ascariasis*—Passage of larvae from intestines to lungs is quick if the liver is bypassed or infection is mild. The liver may be enlarged and tender if infection is heavy. Often the earliest symptoms occur when the larvae reach the lungs, causing pneumonitis or pneumonia with symptoms varying from cough to severe dyspnoea with wheezing and occasionally hemoptysis Fever together with eosinophilia may also occur. Ascaris larvae are found in sputum of these patients. During the migratory phase there may also be transient itching and an urticarial rash. Invasion of mesenteric glands by the larvae may cause digestive symptoms and ill-defined abdominal pain.

*Adult worm phase*—Intestinal colic and passage of worms in stools are the usual manifestations in mild to moderate infection. In heavy infections intestinal obstruction with at times perforation and volvulus may occur. In addition there may be malabsorption, malnutrition and abdominal distension. Migration of worms into orifices such as appendix, bile duct and pancreatic duct will produce signs of acute appendicitis, or severe pain, vomiting, jaundice and shock resembling clinical

anorexia and loss of body weight, abdominal discomfort, hot flushes, vague aches and pains in the body, tingling and numbness, dryness of mouth, constipation, urinary frequency, menstrual changes like amenorrhoea, sexual disturbance like diminished sex drive, and interest, cardiovascular disturbances like pain in the chest, palpitation, breathlessness, headache and heaviness of head, giddiness, blurred vision, dermatological disturbances like pruritus or rash, excessive or diminished perspiration, neurodermatitis, etc.

2. *Emotional symptoms*—A wide variation in quality as well as severity is observed. Common symptoms are—despondency or gloom, loss of cheerfulness, diminished enthusiasm and interest in activities, crying spells, lack of confidence, irritability, unexplained fears (phobias), haunting ideas (obsessions), anxiety, feelings of guilt, remorse or sin, ideas of worthlessness, uselessness and hopelessness, suicidal tendencies, rumination.
3. *Psychological symptoms*—These emerge gradually and remain unnoticed for a very long time. Seldom reported by the patients unless specifically enquired for. Common symptoms are—psychomotor retardation i.e. slowing down of physical and mental functions, avoiding people and social responsibilities, tendency to postpone and indecisiveness, neglect of daily routines and work, negativism and stupor, impaired concentration and forgetfulness, delusions of various types like somatic, poverty, remorse and guilt, nihilistic, paranoid, etc, illusions and hallucinations, unexplained worries and anxieties.

**Types**—Two types are recognised:

(I) Typical i e. existing in pure form and

(II) Atypical—associated with other conditions.

Differences between Autogenous and Reactive depression—

| *Autogenous depression* | *Reactive depression* |
|---|---|
| 1. Significant stress situation preceding the attack absent or of a minor intensity. | 1. Significant stress situation preceding the attack always present and is of moderate or severe intensity. |
| 2. Biological factors like heredity, constitution etc. are more important than the environmental factors as etiological agents. | 2 Environmental factors are more important than biological factors as etiological agents. |

*Piperazine derivatives*—adipate, calcium edetate, citrate or phosphate, as tablets or syrup. Single adult dose of 75 mg/kg with maximum individual dose of 4 g. Two doses on successive days give higher cure rate. Side effects—Occasionally nausea, vomiting, abdominal pain and diarrhoea. Temporary ataxia has been described while large doses may cause convulsions in children. Piperazine is contraindicated in renal or liver disease, or epilepsy.

*Pyrantel embonate*—Single oral dose of 10 mg./kg. body weight.

*Mebendazole*—Dose 20 mg. b d. for 3 days.

**Tapeworm** (Cestodes)—Tapeworm may parasatise man as adults (Tenia saginata), larvae (hydatid cysts) or both (Tenia solium).

T. SAGINATA—is the commonest tapeworm affecting man. The larval stage (cysticercus) is found in beef and infection is acquired by eating beef containing a living cysticercus.

*Life cycle*—When a living cysticercus is swallowed, the tapeworm head which it contains will emerge, attach itself to the mucous membrane of the upper jejunum and develop into a full-grown worm over the next 3 months.

*Symptoms*—Recognised when segments of the worm are passed in stool or come out of the anus spontaneously. Other symptoms ascribed to the presence of the worm are weight loss, excessive hunger, abdominal pains and gurgling.

T. SOLIUM—Infection is caused by eating pork which contains a living cysticercus. Human cysticercosis arises either from swallowing T. solium eggs on contaminated food or by autoinfection from eggs produced by an adult worm in the host's intestine.

*Cysticercosis*—The larval stages of T. solium tend to settle in either voluntary muscles or brain, but any tissue can be involved Early symptoms—Non-specific symptoms may occur during early stage of invasion of tissue by cysticerci, such as fever, headache and urticaria accompanied by eosinophilia. Localising symptoms and signs may occur after incubation period of usually 3-7 years. Skin and muscle—Visible or palpable subcutaneous cysts may occur, felt as nodules of varying dimensions especially in abdominal muscles and pectorals. Brain and meninges—Epileptic fits are among the early manifestations. Nausea, vomiting, headache, dizziness. Obstruction of circulation of CSF may re-

(b) INVOLUTIONAL DEPRESSION—This type of depression occurs for the first time around the period of involution, i e. around the age of 45 to 55 years. In females, it is usually associated with menopause. In addition to the classical symptoms of depression, these patients suffer from anxiety states, hypochondriasis and paranoid ideation. The presickness personality of these patients is usually obsessive.

(c) DEPRESSIVE PHASE OF MANIC DEPRESSIVE PSYCHOSIS—Manic depressive psychosis is a functional psychosis characterised by alternating cycles of manic psychosis and depressive psychosis. The patients suffering from these illnesses usually have a cyclothymic temperament i.e. a mood state fluctuating between elation and depression. A history of other members of the family having suffered from the same illness is very common since the disease is transmitted through autosomal genes in a dominant fashion. The attack of depression is similar to an attack of psychotic depressive reaction.

**2. Neurotic or reactive depression:**

This type of depression occurs usually in persons of anxious, melancholic or obsessive personality. The illness is preceded by a physical, physiological and/or psychological stress situation like death in family, loss of job or prestige, financial stress, marital and sexual disharmony etc. The patient shows all the symptoms of depression except those of autonomic nervous system dysfunction. The patient suffers from early night insomnia, feels better in the morning than in the evening, and also when in a company than when alone. Occasionally, they suffer from symptoms of anxiety state also.

**II. Atypical depressions—**

This group refers to the clinical syndrome of depression associated with pneumonia and influenza, malignancy of any organ, arterioscelerosis of central nervous system, heart disease, endocrine disturbances, pellagra and potassium deficiency, schizophrenia, drug induced depressions, old age, puerperium, epilepsy, menstrual and premenstrual periods, poisons, post-infective and post-encephalitic states, etc.

**Prognosis:** Suicidal tendencies and attempts are unpredictable, hence caution is always needed while determining the prognosis, 1. Duration of illness—Shorter duration carries better prognosis. 2. Type of depression—Autogenous and reactive depressions carry a better short term prognosis than atypical depressions whereas reactive depression has better long term

before meals. Ammoniated mercury or merthiolate ointment over perianal region at night to control pruritus. All infected members of the family should be treated simultaneously.

**Strongyloides stercoralis**—Infection is acquired in the same way as hookworms and thereafter it is self-perpetuating.

*Symptoms*—As a rule no appreciable symptoms except occasional gastro-intestinal upsets. Local penetration or sensitivity reactions cause an eruption characterized by urticaria and a form of creeping eruption.

*Treatment*—Thiabendazole 25 mg/kg b.d. for 3 days (maximum dose 3 g./day) after meals. The tablets must be chewed Side effects—common. Nausea, anorexia, vomiting, diarrhoea and giddiness. Rarely drowsiness, pruritus, xanthopsia, bradycardia and hypotension. Urine often smells of asparagus.

**Giardia**: Giardiasis in infection of dudenum and jejunum with flaggelated protozoon Giardia. The parasite exists in two forms—The trophozoite which has a characteristic appearance likened to a badminton racket, a Chinese kite or a bespectaled old man; the cysts are oval with double-contoured walls.

*Clinical features*—(1) Asymptomatic in majority. (2) Outbreaks of diarrhoea in institutions especially children's nurseries. (3) Traveller's diarrhoea—loose, foul smelling stools, mid-epigastric cramps, nausea, anorexia, flatulence and abdominal distension (4) Chronic giardia infection—(a) In children chronic diarrhoea, asthenia and failure to thrive. (b) In adults intermittent diarrhoea, anorexia, loss of weight. (5) Chronic intestinal malabsorption.

*Treatment*—(a) *Metronidazole* 2 g orally in single dose at bed time for 3 days. (Children between 4-8 years half the adult dose), or *Tinidazole* 1-2 g single dose Contraindicated in pregnancy. (b) *Mepacrine*—100 mg t.d s. for 5-7 days. Side effects include gastric irritation, fever, yellow discolouration of skin, rashes and even psychosis.

**Trichuris trichuria** (Whip worm)—Symptoms—Mild infections are usually asymptomatic, or there may cause vague abdominal pain and diarrhoea In heavy infection, especially in undernourished children, there may be chronic diarrhoea with tenesmus and blood in stools A variable degree of anemia may occur. Severe manifestations include occasional rectal prolapse and volvulus.

in order to avoid sleep disturbances. 3. The drugs should not be continued for more than 2 to 3 weeks since there is a danger that the patient may develop tolerance, habituation or addiction).

(c) *Sedatives*—A nonbarbiturate should be given if the patient is agitated.

(d) *Hypnotics* (Nonbarbiturates)—very useful since insomnia is a very troublesome symptom.

(e) *Tranquillisers*—e.g. Meprobamate 200 to 400 mg. t.d.s. or Chlordiazepoxide 10 to 20 mg. t.d.s. or Diazepam 5 mg. t.d.s. if the patient is anxious.

(f) *Neuroleptics*—e.g. Chlorpromazine hydrochloride 25 to 50 mg. t.d.s. or Trifluperazine 2.5 to 5 mg. t.d.s. if the psychotic symptoms are marked.

Drug treatment is indicated in (i) Mild to moderate degree of depression. (ii) Patients where E.C.T. is contraindicated or ineffective. (iii) Addition to other treatments like E C.T. and psychotherapy. (iv) Maintenance of recovery—the drugs have to be continued for a long period, 6 to 18 months to avoid relapse of symptoms.

4. INSULIN THERAPY—Insulin subcoma therapy consisting of 20 to 30 treatments spread out over a period of 3 to 4 weeks is useful in reactive depression and mild to moderate degree of autogenous depression. Insulin coma therapy is sometimes used for chronic depressions.

5. PSYCHOTHERAPY AND CASE WORK—Superficial or supportive type is the principal treatment for reactive depression and for autogenous depression after the remission of symptoms to correct the underlying psychopathology. Deep or analytical psychotherapy used for the few resistant cases.

6. OCCUPATIONAL THERAPY, WORK THERAPY, ART THERAPY, MUSIC THERAPY—limited value by themselves. Useful as additional treatments along with other treatments.

## III. Mania

**Definition:** This is a type of functional psychosis, the symptoms of which are diametrically opposite to those of depression. The disease is characterised by a triad of elevation of mood, flight of ideas and increased psychomotor activity. There are some patients who suffer from attacks of mania and depression alternating with each other and the syndrome is called manic depressive psychosis or cyclic psychosis.

iron deficiency and the anemia may be predominantly hypochromic.

8. Personality changes e.g. irritability.

*X-ray*—Loss of normal feathery, or herring bone appearance of upper part of small intestine. In severe cases the appearance of the bowel resembles a tube into which wax has been poured and allowed to harden (moulage sign).

*Complications*—(i) Signs of cord involvement or peripheral neuritis may appear. (ii) Oedema especially on feet and legs (iii) Purpura. (iv) Tetany.

*Course*—Sprue relapses are uncommon after adequate treatment (unlike idiopathic steatorrhoea) and where they do occur, ultimately respond to treatment. Fatal cases are rare.

DIAGNOSIS—(1) Jejunal biopsy—Villous atrophy (2) Tests of intestinal absorption—(a) Examination of stool—for fat balance test. A measured amount of fat (50-70 gm. daily) is ingested and faecal excretion measured over a 4-day period. Absorption of less than 90% indicates defective fat absorption. (b) Flat oral glucose tolerance curve. (c) Low serum calcium.

**Differential Diagnosis :**

1. *Other megaloblastic anemias.*
2. *Idiopathic steatorrhoea*—Long history. In sprue onset and course often more rapid, diarrhoea almost invariable, anemia tends to be more severe and is commonly normochromic or hypochromic. Hypocalcemia and cramps uncommon, stomatitis more marked, anorexia and abdominal pain more common. No specific response to folic acid or antibiotics.
3. *Chronic pancreatitis*—Faeces contain high percentage of neutral fat but split fat content low, the reverse is true in sprue.
4. *Giardiasis*—may cause steatorrhoea. Diagnosis made by finding cysts of the parasite in formed stools and vegetative forms in fluid stools.

**Management :**

Aims—(i) Rest to alimentary canal by dietary regime. (ii) Correction of anemia and gross deficiency conditions.

1. *Rest*—complete rest in bed for severe cases, restriction of activity for mild cases.

In addition, the patient may suffer from delusions of grandeur, suspiciousness and persecution, hallucinations of the auditory variety and excess consumption of alcohol or drugs.

**Types of Mania :**

1. *Hypomania*—Mild form of exaltation with excessive self evaluation and over-estimation of personal abilities and importance. Garrulity, restlessness and instability of purpose and emotion. Patient may be socially acceptable and working efficiency unimpaired if the symptoms are not obstructive.
2. *Acute mania*—An attack of mania with all the typical clinical features.
3. *Delirious mania*—A severe form of acute mania precipitated by exceptional physical or emotional stress and associated commonly with an infection or intoxication. A few days of irritability, restlessness and insomnia are followed by extreme excitement with deterioration in physical health. Clouding of consciousness, disorientation, hallucinations, delusions and incoherence are also present.
4. *Chronic mania*—A state of mania, lasting over a long period, even 20 years or more. Clinical features are in an attenuated form.

PROGNOSIS : Determined by same factors as in depression.

**Management :**

1. *Hospitalization*—Indicated in (a) Acute mania. (b) Mania with sexual promiscuity, criminal and homicidal tendencies. (c) Delirious mania.
2. *Electroconvulsive therapy*—Indicated in manias which do not respond adequately to drugs. 6 to 8 convulsions spread out over a period of 3 to 4 weeks are sufficient to bring about remission of symptoms.
3. *Drug therapy*—
   (i) Neuroleptics—
      (a) Phenothiazines, viz , Chlorpromazine hydrochloride (300 to 600 mg. per day, orally or parenterally).
      (b) Butyrophenones, e.g., Haloperidol 1.5 to 6 mg. per day, or Trifluperidol 1.5 to 4.5 mg. per day orally or parenterally.

of sweating. On examination the skin is hot and flushed and dry, pulse rapid, irregular and weak, and low B P. Temperature may reach between 105-107°F. If the patient is not treated the temperature continues to rise and a state of hyperpyrexia supervenes.

*Management*—Cooling by fanning after sprinkling with water. Immersion in cold water or use of ice packs or ice water enemas. Massage of extremities to maintain circulation. Sedatives contraindicated unless convulsions. Normal saline 1000 ml IV slowly if dehydration or cramps.

2. **Heat exhaustion**—Three types:

(a) *Due to anhidrosis*—Due to acute heat stress after long residence in tropics; may follow prickly heat. Feeling of heat and exhaustion and headache, giddiness and palpitation. Fever 99-100°F, tachycardia and increased respiratory rate. Collapse and coma may occur.

*Management*—consists of removal to cool surroundings.

(b) *Due to salt deficiency*—Predominant salt depletion prone to occur during periods of acclimatization. Anorexia, nausea, vomiting, syncope, giddiness, painful spasms of muscles of abdomen and extremities. Skin moist and cool, pulse rapid, and low blood pressure. Circulatory failure or sudden collapse may follow.

*Management*—Half-strength normal saline by mouth with fruit juice, or if necessary normal saline intravenously.

(c) *Due to water deficiency*—Syndrome of predominant dehydration with elevated serum sodium Usually seen during illnesses which prevent proper intake or absorption of water e g. cardiac or cerebral disease. Intense thirst main complaint. Also lethargy, fatigue, irritability, abdominal discomfort and tingling in the limbs with ultimately mental confusion and muscular incoordination.

*Management*—Large amounts of water by mouth, or IV 5 per cent glucose. Since the total body sodium is likely to be reduced, sodium depletion may occur during phase of rehydration and salt-containing drinks should be administered as soon as improvement is observed.

*Differences between Psychosis and Neurosis:*

| | *Psychosis* | *Neurosis* |
|---|---|---|
| *Etiology:* | | |
| Biological factors ... | More important | Less important |
| Environmental factors | Less important | More important |
| *Psychopathology:* | | |
| Personality disintegration | Total | Partial |
| *Clinical manifestations:* | | |
| 1. Touch with reality .. | Lost | Not lost |
| 2. Insight into the illness | Lost (Patient believes that he is all right but family members & relatives are sick) | Not lost (Patient complains of illness but family members and relatives believe that the patient is not sick and is making a big fuss) |
| 3 Judgement ... (i e. capacity to discriminate between right and wrong, good and bad, ethical and unethical). | Lost | Not lost |
| 4. Social relationship and behaviour | Affected | Not affected |
| 5. Personal toilet . | Neglected | Not neglected |
| 6. Disturbances of mental functions like thinking, emotion and behaviour | Gross | Minor |
| 7. Disturbances of intelligence, memory, attention, consciousness and orientation | Common | Rare |
| 8. Disturbances of belief (viz. delusions) and perception (viz. illusion and hallucination) | Common | Rare |
| *Prognosis* ... | More malignant than benign. Difficult to treat Recovery may not be always possible or complete. Relapses are common. | More benign than malignant Easy to treat. Recovery is almost always possible and complete. Relapses are uncommon. |
| *Treatment:* | | |
| 1. Electroconvulsive therapy | Very useful | Not useful |

**Radiology**—Osteosclerosis in spine and pelvis. Beaking and chalky white ground-glass appearance. Calcification of intervertebral ligament, sacrospinous and sacrotuberous ligament and of interosseous membrane of forearm.

*Biochemical investigations*—Increased fluoride content of urine and blood.

**Treatment:**

*Preventive*—Defluorination of water, drilling of tube wells, vitamin C may help.

*Of the disease*—(a) Medical—Serpentine, a naturally occurring metasilicate or magnesium has been tried. Vitamin C supplementation. Yanadium—has recently been found useful. Teeth and skeletal changes are permanent. (b) Surgical—Laminectomy if cord compression.

**Etiology:** Biological factors like heredity, constitution, endocrine disturbances, metabolic and biochemical abnormalities are not considered as significant causes. Environmental factors are rated as more important causes.

1. Age—Childhood, adolescence and involution are the periods most susceptible to this illness.
2. Sex—incidence is equal in both sexes, though at different ages, it may be more in one sex than another.
3. Personality—Persons with anxious, inadequate and obsessive personalities are more susceptible to this illness.
4. Frustration in sexual aim is considered by some as important but no authentic evidence is yet available. Inadequate informations about sexual functions sometimes form the nucleus of the illness.
5. Precipitation—Physical, physiological and psychological stress of a moderate to severe degree even in well adjusted personalities triggers off the illness. Factors like difficult family situation, occcupational and financial difficulties and heavy responsibilities without adequate support, prolonged or debilitating physical illness like influenza commonly precede the onset of the illness.

**Clinical manifestations:** These are broadly grouped into:

1. *Physiological*—They are referable to autonomic nervous system dysthymia or imbalance and commonly include palpitations, shortness of breath, tremulousness and unsteadiness, dryness of mouth and diminished appetite, headache and heaviness of head, giddiness and blurring of vision, frequency of micturition and diarrhoea, and excessive sweating particularly in palms and soles, etc. On examination, one finds tachycardia, elevation of blood pressure, increase in depth and frequency of respiration, exaggerated deep reflexes.
2. *Psychological*—Worries, nervousness, apprehension, irritability and a morbid fear as if something dreadful is going to happen, are the commonest. Difficulty in concentration and forgetfulness, sleep disturbances, including nightmares, vague somatic symptoms, reduction in efficiency, feeling fatigued and tired.

TYPES:

1. *Acute anxiety reaction*—also known as Panic. Physiological symptoms are most marked Patient may be bewildered, confused and agitated.

**Growth parameters:**

(1) *Height or length*:

Foetus 8 weeks: 2.5 cm
12 weeks: 7.5 cm
28 weeks: 35 cm

Birth: 50 cm
1 year: adds on 1/2 of birth length 75 cm
2 years: adds on 1/2 of 1st years' growth 87-88 cm
Thereafter till adolescence growth spurt about 6-8 cm per year.
Weech's formula that can be used from 2–12 years. Age (yr) × 6 + 77 cm.

(2) *Weight*: Sensitive growth parameter, first to decrease in acute malnutrition.

Foetus 8 weeks: 1 gm
12 weeks: 14 gm
28 weeks: 1000 gm

Birth: 2.5-3.7 kg. Less than 2.5 kg considered low birth weight. Weight loss in first 10 days upto 10% body weight. Thereafter 20 gm per day for first 5 months and about 15 gm per day for 12 months. Furtheron baby doubles birth weight at 5 months, triples at 1 year.

2nd year: gains 2.5 kg
3-5 years. gains 2 kg per year
6-12 years: gains 3-3.5 kg per year.
Approximately 15 kg at 5 years, 25 kg at 10 years, 40 kg at 15 years.
Weech's formula for average weight (in kg)

3-12 months $\frac{\text{age (mths)} + 9}{2}$

1-6 years age (yrs) × 2 + 8

6-12 years $\frac{\text{age (yrs)} \times 7 - 5}{2}$

(3) *Skull circumference*: A good measure of brain growth Maximal in first year, reaches 90-95% adult size by 4 years

Birth: 32-35 cm (less than 30 cm microcephaly)
First 3 months 2 cm per month (av. 39 cm)
4-6 months· 1 cm per month (av. 42 cm)
6-12 months: 1/2 cm per month (av 46-47 cm)

## II. Phobic neurosis

**Definition:** Unexplained and irrational morbid fears about animate and/or inanimated objects are known as phobias. These are considered normal when they occur in certain situations or at certain ages e.g. children upto 6 to 8 years.

**Etiology:** Environmental factors are rated as more significant etiological factors. (i) Age—Children and adolescents are more susceptible. (ii) Sex—Equal incidence in both sexes. (iii) Personality—Anxious, inadequate and obsessive personalities are more prone. (iv) Parent-child relationship—More often abnormal, psychologically traumatic experiences during infancy and early childhood commonly found in the life histories.

*Psychopathology:* According to psychoanalytical school, the phobic object is supposed to be a displaced and symbolic manifestation of repressed intrapsychic conflicts.

**Clinical manifestations:** In early stages, the symptoms usually come up only when the patient is confronted with the phobic object or situation. These symptoms include palpitations, tremulousness, shortness of breath, perspiration, giddiness, dryness of mouth, a sensation of collapse and a fear of impending doom. This attack of panic lasts as long as the patient has to face the phobic object or situation. In later stages of the disease, the patient develops a state of chronic apprehension and the other symptoms of chronic anxiety state.

The common phobic objects are insects, animals, house pets, pins, and needles; the common phobic situations are darkness and brightness, depth and height, closed space, open space and moving vehicles. Diseases which receive wide publicity like tuberculosis, cancer, leprosy, venereal diseases, insanity and heart diseases etc. also form nuclei of phobic symptoms.

PROGNOSIS—Similar to anxiety state.

MANAGEMENT—Same as for anxiety reaction. In recent years, behaviour therapy like relaxation, desensitization, etc. has been attempted with some success.

## III. Obsessive compulsive neurosis

**Definition**—Obsessions are persistent recurrence of unwelcome ideas The patient does not enjoy getting those ideas—actually feels miserable and guilty and makes the best possible efforts to remove them from his mind without any success. The ideas are usually centered around sex, religion, dirt, and germs.

(7) *Chronology of dentition:*

| | Primary tooth eruption | | Permanent tooth eruption | |
|---|---|---|---|---|
| | Maxillary | Mandibular | Maxillary | Mandibular |
| Central incisors | 6-8 mths | 5-7 mths | 7-8 yrs | 6-7 yrs |
| Lateral incisors | 8-11 mths | 7-10 mths | 8-9 yrs | 7-8 yrs |
| Canines | 16-20 mths | 16-20 mths | 11-12 yrs | 9-11 yrs |
| First premolars | — | — | 10-11 yrs | 10-12 yrs |
| Second premolars | — | — | 10-12 yrs | 11-13 yrs |
| First molars | 10-16 mths | 10-16 mths | 6-7 yrs | 6-7 yrs |
| Second molars | 20-30 mths | 20-30 mths | 12-13 yrs | 12-13 yrs |
| Third molars | — | — | 17-25 yrs | 17-25 yrs |

(8) *Ossification centre appearances in infancy and childhood.*
Birth: Distal femoral, proximal tibial, cuboid.

3 wks: Head of humerus
2-4 mths: Hamate
4-6 mths: Head of femur
1 year: Distal radial
2 years: Distal tibia and fibula, capitellum of humerus.
3 years: Triquestral bone, heads of metacarpals and phalanges of hand.
4 years: Lunate, navicular of foot, greater trochanter of femur.
5-6 years: Scaphoid, trapezoid, trapezium, lower ulnar epiphysis, upper epiphysis of radius, medial epicondyle of humerus.
7-8 years: Lower epiphysis of ulna.
9-10 years: Olecranon, trochlea of humerus, pisiform
11-12 years: Lateral epicondyle of humerus.

(9) *Milestones of development*: Importance: (a) Assessment of step by step age-wise physicomotor and mental development. (b) Early detection of motor disorders, cerebral palsy, mental retardation, speech, auditory and visual defects (c) Assessment of etiology of developmental delay—congenital if poor milestones development from beginning, acquired or hereditary/acquired degenerative neuromuscular or CNS disease if arrest occurs after certain stage is reached (d) Assessment of approximate point in time when pathology began, e g, age at which malnutrition set in to cause developmental retardation.

Classification: (continued on p. 685.)

to his personality and tries to fight against it. There is no intellectual impairment. The symptoms can take three forms:

1. *Obsessional thoughts*—Usually of a religious, philosophical or scientific subject. Contrast ideas like ideas of religion followed by ideas of sex. States of doubt and indecision, feelings of depersonalization and derealization (Folie de doute).
2. *Obsessional fears or phobias*—discussed under phobic reaction.
3. *Obsessional urge*—These are compulsions i.e. acts which the patient realize as foolish, useless or even dangerous e.g. repeated hand washing which a patient does because of the haunting idea that whatever has been touched has resulted in dirty hands and therefore needs cleaning. The patients develop elaborate rituals and ceremonials to neutralize the effects of their morbid thoughts and fears.

When the symptoms become severe the patient may develop additional symptoms of anxiety reaction, and/or depression.

PROGNOSIS—Natural remissions of symptoms are known; hence the prognosis is not always gloomy. All the same, in the majority of the patients, the outcome is unfavourable.

**Management:**

1. *Drugs*—Sedatives, hypnotics, tranquillisers and neuroleptics give symptomatic relief in some cases.
2. *E.C.T.*—Indicated in recurrent obsessional states associated with depressive symptoms.
3. *Phychotherapy*—Supportive as well as analytical gives satisfactory results in early cases only.
4. *Behaviour therapy*—Satisfactory results are seen in some patients.
5. *Psychosurgery*—Prefrontal leucotomy is recommended for chronic and intractable cases. This may benefit some.

### IV. Hysteria (Conversion and Dissociation Neurosis)

**Definition**—No precise definition of this illness is available. Commonly it is accepted that hysteria is a type of neurosis characterised by—(1) somatic and/or psychological symptoms without any organic basis and (2) symptoms having psychological motivation, described in terms of (a) primary gain which is resolution of intrapsychic conflict and discharge of associated tension, and (b) secondary gain which is in the form of sympathy

| *Age* | *Motor* | *Adaptive* | *Language* | *Social* |
|---|---|---|---|---|
| 16 weeks ... | Lifts head and chest, legs extended, arms outstretched. Symmetrical posture now, head in midline | Hands in midline, tries to grasp with both hands and misses object Follows ball rolling on table. | Turns head to sound. Laughs out aloud. | Displeasure if social contact broken, excited at sight of food. |
| 20 weeks ... | Turns over prone to supine. Lifts up head, half of chest, arms outstretched. Sits with support with rounded back. | Goes out for object with one hand, may miss. Grasps voluntarily if object placed in hand | Vowel sounds. Pitch variations. | Plays with strangers, demands prolonged contact |
| 24 weeks ... | Turns over prone to supine Sits propped up with straight back momentarily without support. Supports weight on legs. | Grasps object offered, waves it in hand Attempts to mouth it. Binocular vision develops Regards mirror image. | Grunts, growls. Says 'ga-ga'. | Responds to name. Initiates contact by making sounds. Knows strangers. |
| 28 weeks ... | Pivots; squirming movements. Sits on his own with hand support. Bounces when stood up. | Grasps large object with intermediate palmar grip, transfers objects, mouths actively, rakes at small objects. | Polysyllabic vowels. Bubbles at mother. | Enjoys mirror. Pats image. Cries if shouted at. |
| 36 weeks ... | Sits up alone and well with support with a straight back. Creeps on all fours. | Radial grasp of objects. Assisted pincer grasp. Rakes at small object with index finger. | Monosyllabic cosonants — labials 'ma', 'ba'. Can announce his arrival with sounds. Understands 'No'. | Develops fear of strangers. Plays 'peak-a-boo'. |

(1) They are psychogenic in origin. (2) They serve the primary and secondary gain. (3) They cannot be explained in terms of any known organic diseases. (4) They have no anatomical basis. (5) They seldom occur when the patient is alone and are exaggerated in presence of a sympathetic audience. (6) They change qualitatively and quantitatively with different examiners. (7) Patient is indifferent to the symptoms even though they are incapacitating (la belle indifference).

The various symptoms can be grouped into :

1. *Symptoms of conversion reaction*—These arise because of the involvement of voluntary neuromuscular system. (a) Motor symptoms—These are of two types : (i) Akinesia e.g. paresis or paralysis involving a part of the body like monoplegia, hemiplegia, paraplegia, etc. (ii) Hyperkinesia, e.g. tremors, occupational and writer's cramp, torticollis, convulsions or fits, etc. (b) Sensory symptoms : These can be in the form of anaesthesia, hypoaesthesia, hyperaesthesia and paraesthesia. This disturbance can affect all the general sensations namely touch, pain and temperature. Special sensory systems like sight, hearing, smell and taste can also be disturbed in the same way e.g. blindness, deafness etc. (c) Visceral symptoms—Common ones are hiccoughs, vomiting, dyspnoea, dysphagia, aphonia, etc.
2. *Symptoms of dissociation reaction—(Psychological symptoms)*—(a) Somnambulism and somniloquy. (b) Amnesia—usually circumscribed type and covers up the psychologically traumatic event. (c) Trance i e. an altered state of consciousness lasting for a few minutes to a few hours, during which the patient suspends the physiological functions. (d) Fugue i.e. an altered state of consciousness wherein the patient travels long distances over a period of days and has amnesia for the entire episode. (e) Double and multiple personalities like Dr. Jekyl and Mr. Hyde. (f) Ganser's syndrome wherein the patient complains of pseudodementia and has circumstantiality.

PROGNOSIS : On the whole, the prognosis is good and is determined by the following factors : 1. Intelligence—low intelligence makes the recovery difficult. 2. Physical defects and physical illnesses—presence of these carries poor prognosis. 3. Personality—immature and hysterical personality does not carry good prognosis. Even with adequate treatment, relapses are more frequent with this personality. 4. Possibility of environmental change—

| *Age* | *Motor* | *Adaptive* | *Language* | *Social* |
|---|---|---|---|---|
| 3 years ... | Stands on one foot. Rides tricycle | Copies circle, forms a cross. Tower of 9 cubes. Forms 'bridge' of 3 cubes. | Knows age and sex. Counts 3 objects well Full sentences. Uses plurals and prepositions. | Dry by night. Plays with other children. |
| 4 years ... | Hops Climbs well. Throws ball over-hand. | Uses scissors. Draws a man with 2 to 3 parts. Copies square. Hand dominance. | Tells stories 1600 words, 4 words per sentence. Knows colours. | Social interaction and role-playing. Runs errands. |
| 5 years ... | Skips. | Names heavier of 2 weights. Copies triangle. Draws man with 3-4 parts. | Sentences of 5 words, counts 10 objects well. | Asks questions about meanings. |
| 6 years ... | Acquires finer motor skills. Simple gymnastics | Draws full man with clothes. Adds and subtracts | 2000 words. | Knows time of day. Knows right from left, good from bad. |
| 7 years ... | — | Copies a diamond. | Most childhood difficulties gone. Speech clear. | Avoids self-exposure Knows about sex. |

Under the group of psychosomatic illnesses are included those diseases where emotional disturbances produce intrapsychic conflicts and the anxiety and tension resulting therefrom get channelised through the autonomic nervous system. These illnesses differ from hysteria in this important aspect. In hysteria the repressed instinctual urges are expressed through the cortical discharge or inhibition, thus involving the voluntary neuromuscular system. Also the secondary gain in the form of attempts to gain the sympathy and attention and the classical la belle indifference of hysterical reactions are not observed in psychosomatic illnesses.

**Clinical manifestations:**

The commonly recognised psychosomatic conditions according to the various systems are:

1. *Gastrointestinal*—Peptic ulcer, ulcerative colitis, anorexia nervosa, cardiospasm.
2. *Cardiovascular*—Cardiac neurosis, hypertension.
3. *Respiratory*—Bronchial asthma.
4. *Urogenital*—Impotence, frigidity, menstrual disorders like amenorrhoea, dysmenorrhoea, menorrhagia, metropathia hemorrhagica.
5. *Dermatological*—Urticaria, angioneurotic oedema, psoriasis, neurodermatitis, eczema.
6. *Endocrinal*—Thyrotoxicosis, diabetes, obesity.
7. *Musculoskeletal*—Rheumatoid arthritis.
8. *Vasomotor*—Migraine.

THEORIES—Convincing evidences, both experimental and clinical, have been gathered to show that emotional disturbances are responsible as predisposing, precipitating and perpetuating factors in these illnesses once popularly known as somatic. Several theories have been put forward to reveal the evolution of these.

1. *Neuroendocrinal theory*—a common denominator here is the autonomic nervous system. Autonomic nervous system influences and is influenced by other parts of the nervous system like the limbic system, the neocortex etc. and the endocrines like the anterior pituitary, the adrenal cortex, the adrenal medulla etc. Complex interrelationships of these various structures have been worked out to explain the translation of the conflicts arising from the problems of every day living into abnormal physiological functions and the tissue damage. Hypothalamus being the centre for the sympathetic and the parasympathetic activities is of central importance in these feed back circuits. It is easy

response to extension of forearm develops after 35 weeks. (13) In very premature infants breathing may not be regular and there may be apnoeic spells. (14) Body temperature regulation is poor.

**Complications**—1. *Infection*—Septicemia and sclerema neonatorum Baby appears lethargic, becomes pale hypo or hyperthermic. Abdominal distension, vomiting and paralytic ileus may develop. Skin becomes thick and adherent to underlying tissue (sclerema naonatorum). 2. *Respiratory distress syndrome*—due to hyaline membrane disease pneumonia, meconium aspiration. 3 *Apnoeic spells*—due to prematurity, intracranial hemorrhage, intrapulmonary hemorrhage, hypoglycemia. 4. *Hypoglycemia*—Baby becomes lethargic, develops convulsions or cyanosis. 5. *Retrolental fibroplasia*—due to excess oxygen in the environment.

**Management**—1. Regulate the body temperature by putting the infant in an incubator, or by wrapping it in plastic and woollen wrappers. Maintain the body temperature at 37°C, and rectal temp. at 38°C. 2. Feed the infant with a nasogastric tube till good sucking develops. Aim at giving 120 to 150 calories and 120 to 150 ml. of fluid per kg. of body weight, by the 6th or 7th day of life. Feeds should be given in small equally divided quantities every 3 hours round the clock Start feeding early by the 6th hour of life, unless respiratory distress develops. 3. Strict barrier nursing observing aseptic technique is imperative, because of proneness to infection. 4 Give 1 mg of vitamin K at birth. Start vitamin C and multivitamin drops by 10th day of life.

## 3. JAUNDICE IN THE NEW BORN

**Etiology :**

Normal bilirubin metabolism requires the following factors—(i) Maturity of liver. (ii) Normal load of bilirubin. (iii) Adequate quality and quantity of glucuronic acid conjugate for conversion of lipid-soluble (indirect) bilirubin to water-soluble (direct) bilirubin for proper excretion (iv) Normal biliary passages.

**Varieties :**

1. *Immature liver*—(a) Jaundice of prematurity. (b) Physiological jaundice.

an organ conditions it to subsequent illnesses. Sometimes the involvement of a particular organ is just a concomitant of other illness. One author has emphasised the importance of the pre-morbid personality in the selection of an organ. She has prepared "personality profiles" for each psychosomatic illness. Thus, there will be "the peptic ulcer type", "the ulcerative colitis type", etc. Another believes in the specific correlation between the nature of the conflict and the personality make up of the individual as the determinant factor. Conflicts centered around love and dependency relations produce parasympathetic overactivity manifesting itself in conditions like peptic ulcer, ulcerative colitis, bronchial asthma, etc. Conflicts centered around aggression and hostility result in sympathetic overactivity exhibited in conditions like thyrotoxicosis, hypertension, migraine etc. One worker emphasises the place of the particular organ in the biological offence or defence mechanisms whereas another has stressed the social change and mobility as the chief factors in these illnesses.

While reviewing all these facets of the psychosomatic diseases, it must be borne in mind that the psychological factors are not the only responsible agents but the genetic, constitutional, endocrinal and metabolic disturbances also contribute in the production of these conditions. In one particular case, one or more of these factors may be of greater importance than the others. Neither factor alone is operative but it is the ultimate interactions of all these varied etiological factors which result in a psychosomatic condition This view has a very important bearing in the treatment procedures of these diseases.

**Treatment:** These patients have not to be treated for their stomach or heart troubles alone. Careful attention has to be given to the emotional and the psychological factors contributing to these illnesses for better therapeutic results, short term as well as long term. In this respect, an internist with good orientation in the principles of psychological medicine will prove a better physician to these sufferers. A psychiatrist may have to be included in the medical team managing these patients. The psychiatrist alone can also take up such cases for treatment, his chief therapeutic weapon being the psychoanalytically oriented psychotherapy designed and aimed at correcting the basic personality problems Occasionally antianxiety and antidepressant drugs may be of help, particularly in the control of the acute exacerbations of the symptoms Psychophysiological therapies such as yoga therapy, behaviour therapy and biofeedback have been claimed to give good results in some conditions.

fatal in the acute stages. Bile pigments in urine and marked increase of nucleated red cells in circulation.

(c) *Hemolytic jaundice due to congenitally abnormal erythrocytes* (Hereditary spherocytosis)—When much blood is lysed jaundice may become intense, this depending on intensity of hemolysis and prematurity of liver.

**3. Obstructive jaundice—**

*Congenital atresia of bile ducts*—Jaundice appears 7-10 days after birth and gets progressively worse. Stools clay coloured, and urine dark containing bile salts and pigments. Gradual enlargement of liver and spleen but no anemia. Hemorrhages may occur into the skin or from stomach or intestines. Fatal within 3 to 8 months.

**4. Other causes—**

(a) *Jaundice due to infections*—Septicemia usually from pyogenic umbilical infection, congenital syphilis, generalised herpes simplex infection. Toxoplasmosis and cytomegalic inclusion disease.

(b) *Congenital familial nonhaemolytic jaundice*—(Crigler and Najar) Familial Jaundice on second day, increasing. Liver and spleen do not enlarge, and anaemia is not prominent Infant may die of kernicterus

**Kernicterus**—It is a symptom-complex which results from the fixation of indirect bilirubin to basal ganglia in the brain. It usually occurs when serum indirect bilirubin of more than 20 mg. persists in blood for more than 24 hours. Clinical manifestations start on 2nd to 6th day. Child is toxic, jaundiced, stops sucking and starts getting opisthotonic fits, and later generalised convulsions. The damage usually becomes gradually obvious (if not fatal) and by the age of 3 years child has bilateral choreoathetotic movements, mental retardation and dystonic spasms. Other neurological signs proportionate to the widespread involvement may be present. Treatment consists of exchange transfusion in early stages.

MANAGEMENT OF JAUNDICE IN THE NEWBORN—

1. Send cord blood for serum bilirubin, hemoglobin, Coomb's test, and blood grouping when incompatibility is suspected.
2. Start phototherapy when serum bilirubin is higher than 10 mg % or is rising fast.
3. Phenobarbitone 5 mg/kg day orally to hasten maturation of the liver microsomal enzymes. Not useful after 7 days.

1. Heredity and constitution—Psychopathy seems to run in families.
2. Generalised brain dysfunction—E.E.G. in majority of these patients shows generalised abnormality of a slow wave type, probably suggestive of a maturation defect.
3. Maternal deprivation—particularly during infancy and early childhood is often observed in the life histories of these patients.
4. Broken homes—physical and/or psychological, abnormal parent child relationship, inadequate father, dominating and nagging mother.
5. Unhealthy physical environment like overcrowding slums, poor hygiene and sanitation.
6. Antisocial and delinquency traits like stealing, lying, begging, truancy and loafing during childhood.
7. Mental deficiency.

*Types*—1. Aggressive psychopath. 2. Hysterical psychopath. 3 Creative psychopath.

**Treatment:** Very difficult and unsatisfactory. No drugs seem to help them in correcting their behaviour. Other psychiatric treatments also fail in improving them. Psychotherapy and case work have given satisfactory results in a small minority. Prolonged institutionalisation with psychotherapy, work and occupational therapy has been tried out with varying degrees of success.

### Sexual anomalies and perversions

OCCURRENCE—These are usually part of a personality disorder or part of an abnormal emotional reaction (1) Isolated or encapsulated symptoms. (2) Part of a transient abnormal emotional reaction in well adjusted individuals. (3) Symptoms of a generalised deep rooted personality disorder. (4) Symptom of functional psychosis such as manic depressive psychosis or schizophrenia. (5) Epilepsy and other organic syndromes. (6) Emotional and intellectual subnormality.

**'Normal' sexual behaviour:** Ascertainment of facts as to what is normal sexual behaviour is extremely difficult because of secrecy, deceit and subterfuge in our society. There is wide variation in range and variety in the norms in different cultures and societies, in different strata of society and from decade to decade even in the same society and culture. Certain sexual practices like cunnilingus, fellatio homosexual and autosexual

3. *Hematuria*—usually slight loss of blood.
4. *Umbilicus*—severe and even fatal bleeding may occur. It often starts in the form of a steady oozing at the end of the first week.
5. *Lungs*—Acute hemorrhagic pneumonia may start within a few hours. Symptoms consist of rapid pallor and blood stained froth in mouth. Rapidly fatal.
6. *Intracranial*—if large, infant is still born; if less severe—asphyxia, inability to suck well and to swallow, poor ineffective cry, twitchings or convulsions, intermittent cyanosis, bulging fontanelle, rigidity of limbs. Squint, nystagmus and local paralysis may be present.
7. *Adrenal haemorrhage*—may accompany other manifestations of anoxia at birth or later occur as a part of clinical manifestation of haemorrhagic disease.
8. *Skin*—Ecchymotic areas at points of pressure.
9. *Miscellaneous*—Nose, mouth, conjunctiva and retina.

**Management:**

1. Vitamin K—1 mg/kg IM or IV of aqueous preparation.
2. Injections of fresh whole blood—20 mg./kg. if bleeding continues.
3. Blood transfusion for severe cases.

*Prevention*—Administration of vitamin K to the mother in the last months of pregnancy and during labour if mother on dilantin or coumadin Elective surgery like circumcision should be postponed till after a week, but if performed, vitamin K should be given parenterally. Vitamin K 1 mg to all neonates at birth, particularly prematures and low birthweight.

## 5. REGURGITATION AND VOMITING IN THE NEW BORN

**Regurgitation**—is nonforceful expulsion of gastric contents from oesophagus or stomach through the mouth, unaccompanied by nausea or forceful abdominal contractions.

**Causes:**

1. *Physiologic*—in early weeks, referred to as "spitting up". Of no concern if normal weight gain continues Frequency lessens with age.
2. *Faulty feeding techniques*—Lack of burping, eructation of air when supine, prolonged feeding through small nipple, weak caloric formula, bottle-propping, all these lead to aerophagia.

manner of sexual gratification. They are observed in (1) hystericals, (2) weak willed, (3) other personality disorders, (4) situations of non-availability of normal heterosexual manner of gratification ('facultative') e g. camps, prisons etc , (5) pure form as an "illness".

ETIOLOGY—(1) Psychogenic factors are probably the only causes in all perversions except homosexuality where heredity seems to be playing an important role. (2) Primitive people and persons with low intelligence show perversions more often. (3) Psychoanalytical schools regard perversions as the result of regression or arrested emotional development at earlier stages of psychosexual development. (4) More common in men than women.

TYPES—Important ones are:

*Homosexuality* (lesbianism in women)—Sexual gratification through persons of own sex. Varying degrees exist. According to some heredity plays an important role; others believe in psychogenic basis—disturbed emotional relationship between child and parents like overattachment to mother; and poor identification with the father.

*Bestiality*—Sexual gratification with animals Observed in (1) cowboys and shepherds, (2) persons who are shy to establish any human relationship, (3) mentally subnormal individuals.

*Exhibitionism*—Sexual gratification through showing of genitals by men to the members of opposite sex.

*Fetichism*—Sexual stimulation in men from articles like underwares or shoes of women. When the object is a statue, it is called pygmalionism. Gratification is obtained by masturbation, while looking at these articles.

*Voyeurism*—Sexual gratification by watching other people nude or having sexual intercourse.

*Sadism and masochism*—Sexual gratification through inflicting or suffering pain either during sexual intercourse with the member of the opposite sex or totally replacing the urge for heterosexual relations.

*Transvestism*—Sexual gratification through putting on clothes belonging to other sex.

TREATMENT: On the whole unsatisfactory. Psychotherapy helps in better social adjustments rather than in changing the sexual orientation. Behaviour therapy has been used with some success Hormonal treatment, to reduce the sexual drive, has also given some success.

**Investigations :**

A. HISTORY—

1. *Feeding history*—Time of onset of vomiting, history of frothing, choking, cyanosis, failure to gain weight, antenatal and intranatal events.
2. *Appearance of vomitus*—Gastric aspirate with bile more than 20 ml. in new born suggestive of intestinal obstruction. (i) Bilious—Definite sign of obstruction below ampulla of Vater. (ii) Non-bilious—Obstruction above ampulla. (iii) Uncurdled milk—Oesophageal atresia. (iv) Faecal—Lower obstructions. (v) Blood—Peptic ulcer, sepsis, chalasia, haemorrhagic disease
3. *History of polyhydramnios*—Oesophageal atresia, other GI obstructions. History of meconium stained liquor in gastritis.
4. *Site and degree of abdominal distension*—Generalised if jejunal or ileal, epigastric if duodenal.
5. *Stool*—(i) Thick, tenacious meconium—meconium ileus (ii) Malaena—hemorrhagic disease, necrotising enterocolitis, ulcers (iii) Whitish stools—atresia distal to ampulla of Vater.

B. EXAMINATION—

1. *Abdominal examination*—Pyloric lump, rubbery bowel loops in meconium ileus, scaphoid abdomen in diaphragmatic hernia, absent peristalsis in ileus PR examination—imperforate anus, meconium plug
2. *Chest examination*—Medistinal shift to right with cyanosis suggests diaphragmatic hernia.

C INVESTIGATIONS—

1. *Urine*—Routine, aminoacids, culture.
2. *Blood culture.*
3. *CSF*—for sepsis.
4. *Radiographs*—(a) Abdomen (upright)—"Double bubble"—duodenal atresia. (ii) Multiple fluid levels with distension—lower obstruction. (iii) "Bubbly" appearance in right iliac fossa—meconium ileus (iv) Gas under diaphragm—perforation. (v) Gas in mucosal walls of intestine (pneumatosis intestinalis)—necrotising enterocolitis.

**Treatment**

1. Stomach wash with sterile water or normal saline helps in mucus gastritis.

logy. Insulin subcoma treatment is indicated in those patients who have lost weight. Behaviour therapy and biofeedback are claimed to be useful.

## Alcoholism

**Definition**—Alcohol has been used for centuries to obtain relief from discomfort and tension. An average adult can metabolize about 2 ounces of pure alcohol in 24 hours; signs of intoxication appear when the blood concentration exceeds 0 2 per cent. It is difficult to draw a line of demarcation between drinking of alcohol as a social habit and as a medical problem. Loosely, a person should be considered alcoholic, if his drinking interferes with physical and mental health, his relationship and his social and economic life.

**Etiology:** Not clearly understood. Many similarities with drug addiction are observed—1. Social and cultural patterns of drinking alcohol vary. 2. Certain occupations are more predisposed e.g. licensing traders, commercial travellers. 3. Men are more commonly affected than women. 4. Socially inadequate persons are more predisposed 5. Alcoholism is more common in certain personality disorders like psychopathy, it can be a symptom of schizophrenia, hypomania or depression.

**Clinical manifestations:** Disorder develops through stages. Frequency and quantity imperceptibly increase, with inability to abstain. Memory and concentration become poor. Emotions become superficial and labile, with spells of aggressive outbursts which are followed by remorse. Blunting of feelings for family members and for matters of vital concern. Self-centredness and brutality increase. Complications usually develop in the fourth or fifth decade. Physical signs include suffused faces, tremors, evidence of peripheral neuritis, enlarged liver, and irritability of digestive and respiratory systems.

Certain special syndromes are recognised:

1. *Pathological drunkenness* (Acute alcohol psychosis)—A short attack of excitement following consumption of alcohol. Latent personality traits become manifest. Behaviour is bizzare and full of impropriety. Tremors and incoordination are usually present.
2. *Dypsomania*—Periodic craving for alcohol. Bouts of heavy drinking are followed by moderate drinking or even abstinence. It is thought of as obsessional illness, depressive phase of manic depressive psychosis or epileptic equivalent.

Lungs appear liver-like. Mocroscopically there is extensive atelactasis, engorgement of vessels and lining of alveoli by acidophilic homogenous membrane; membranes are seen only 6-8 hours after birth.

**Clinical features:** Signs appear minutes after birth; may require resuscitation. Late tachypnoea is very unusual. (1) Rapid shallow respirations increasing to 60 or more per minute (2) Audible grunting (ominous sign). (3) Intercostal and subcostal retractions. (4) Nasal flare. (5) Duskiness with increasing cyanosis poorly responsive to oxygen. (6) Breath sounds normal or diminished with harsh, tubular quality, fine crepitations on deep inspiration at lung bases.

Worsening is characterised by increased dyspnoea, air hunger, progressive cyanosis, decrease and then absence of grunting, absent breath sounds despite chest movement, hypothermia, hypotension, irregular breathing, acidosis and apnoea; progresses to death in a few hours. Death is rare after 3 days if an infant survives severity of newborn respiratory distress judged by Anderson Silverman's score (see below).

**Complications:**

A. *Of the disease*—(1) Hypoxia, hypercapnia, acidosis, respiratory failure (2) Persistence of ductus arteriosus—delayed closure due to hypoxia, acidosis, increased pulmonary pressure, immaturity of the infant and local release of ductal dilators such as prostaglandin $E_1$ and $E_2$. Causes persistent apnoea, systolic or continuous murmur, increases oxygen dependancy, aggravates hypercapnia, cardiomegaly and cardiac failure. (3) Intraventricular and pulmonary hemorrhage.

B. *Of intensive care*—(1) Tracheal intubation—Obstruction of tube, cardiac arrest during suction, bleeding and ulceration of nose and throat from trauma, vocal cord avulsion, subglotic stenosis, laryngeal oedema and stridor. (2) Umbilical catheterization—Vascular embolism, thrombosis, perforation, ischemic necrosis of viscera, gangrene of legs, hemorrhage after removal of heparinised catheter. (3) Oxygen toxicity—Retrolental fibroplasia, broncho-pulmonary dysplasia. (4) Pneumothorax and pneumoperitoneum (with intubation, respirator). (5) Secondary infection. (6) Anemia due to frequent blood collections.

**Diagnosis:** (1) Low $pO_2 < 50$ mm Hg, $pCO_2 > 50$ mm Hg and acidosis signal respiratory failure. (2) X-ray chest—Fine reti-

calves, muscular paralysis, absent tendon jerks and trophic changes. Mental symptoms include amnesia for recent events due to registration and retention defect, disorientation in time and space, visual hallucinations, mistaken identities, exaggerated emotional reactions or apathy, and confabulation. Permanent mental impairment follows recovery from the attack.

Treatment consists of (a) support to the affected muscles and bed rest followed by massage and exercises and vitamin B complex, particularly thiamine and nicotinic acid, in high doses. Hospital admission is essential. (b) Diazepam 100-400 mg over a prolonged period. (c) Antibiotics for concomitant infection. (d) Correction of electrolyte and fluid deficiencies. (e) Vitamin B pareneterally. (f) Disulfiram—Where abstinence is indicated and patient is stable and well motivated, disulfiram 200 mg each morning can aid the patient's resolve not to drink. The drug is contraindicated if—age over 60, overdose history, impulsiveness, ischaemic heart disease, cerebrovascular disease, severe liver or brain damage, asthma or diabetes mellitus. Patient must be warned about dangers of alcohol consumption within 72 hours of taking the drug.

## 7. MENTAL DEFICIENCY

**Definition**—Incomplete development of mental endowments. This results in failure of development of sufficient intellectual capacity to cope up with the demands of the environment, establish an independent social existence and personality limitation. Thus there is impairment of maturation, learning and/or social adjustment. Common manifestations are delay or failure in sequential evolution of motility, language, control and evacuation of bladder and bowel, inability to interact with other children, inability to acquire and retain knowledge.

**Diagnosis of Intellectual defect:**

(A) *Clinical*—(1) History of mental deficiency in the family. (2) Home environment which hampers the development of mental potentialities due to inadequate intellectual, social and personality forming influences. (3) Evidence of biological inferiority like anomalies of skull such as microcephaly, oxycephaly, hydrocephalus, asymmetry of skull and face, malformations of external ear, eye and nose; thickness of lips, protruding mandible, illformed teeth and deformities of palate. (4) Delay in the

4. *Antibiotics*—because of frequency of superinfection Ampicillin 200 mg/kg IV 12 hourly with gentamicin 5 mg/kg IM 12-hourly.

5. *Exchange transfusion*—may benefit by improving oxygen carrying capacity of blood.

6. *Steroids*—are ineffective and contraindicated.

7. *General measures*—Prevention and treatment of hypothermia and hypoglycemia. IV fluids not more than 80-100 ml/kg/24 hours. Parenetral nutrition if available. Incubator care. Gentle and minimal handling Inj. vitamin K 1 mg to prevent hemorrhage. Dexamethasone 0.2 mg/kg/dose 8-hourly if there is intraventricular hemorrhage. Monitoring if pulse, temperature, respiration, CVP, $pO_2$, blood pH, blood $HCO_3$, Hb., less often serum electrolytes, and blood glucose, ECG.

8 *Use of artificial surfactant*—10 ml intra-tracheally.

PREVENTION—

1. Prevention of prematurity, unnecessary and poorly timed LSCS, management of high risk pregnancy and labour.

2 Assessment of foetal maturity Foetal head circumference by ultrasound, 'shake test' with amniotic fluid and 1 : 2 dilution of 95% ethanol producing complete ring of bubbles at meniscus indicating foetal lung maturity, or determination of amniotic fluid lecithin to sphingomyelin ratio which is 2 : 1 by 35 weeks gestation, increasing till term

3. Antenatal administration to mother of synthetic steroids in absence of toxemia, diabetes or renal disease, 24 to 72 hours prior to delivery of foetus at 32 weeks gestation reduces incidence of and mortality from hyaline membrane disease. One or two doses of 6 mg betamethasone acetate and 6 mg of betamethasone phosphate IM.

Anderson and Silverman's score for newborn respiratory distress :

| | *Upper chest* | *Lower chest retraction* | *Xiphoid retraction* | *Alae nasi flare* | *Expiratory grunt* |
|---|---|---|---|---|---|
| Gr 0 | Synchronised motion | None | None | None | None |
| Gr 1 | Insp lag | Just visible | Minimal | Minimal | With stetho |
| Gr 2 | "See-saw" movement | Marked | Marked | Marked | Naked ear |

placental circulation, overdosage of anesthetic drugs, prenatal irridiation, etc. 4. Disorders of metabolism, growth and nutrition, cerebral lipoidosis, cerebromacluar degeneration, Gaucher's disease, phenylketonuria, maple syrup urine disease and other aminoacidurias, congenital galactosemia, hypoglycemia, gargoylism, hypothyroidism, etc. 5. New growth e g. tuberous sclerosis, neurofibromatosis. 6. Epilepsy. 7. Cerebral palsy. 8. Encephalitis and meningitis. 9. Isolation or sensory deprivation. 10. Unknown prenatal influences, e.g. Mongolism, Klinefelter's syndrome, cranial and cerebral anomalies like craniostenosis, hydrocephalus, microcephaly, oxycephaly, megalencephaly.

**Treatment:** No satisfactory treatment. No drugs are available to increase the level of intelligence. Sedatives, tranquillisers, neuroleptics and stimulants have been tried with varying degrees of success to quieten the patient. Suitable rehabilitation according to the patient's level of intelligence and his aptitude through occupational therapy. Education and training in the schools for the mentally handicapped. Counselling to the parents about the child's illness Psychotherapy and other physical treatments like E.C.T. for the associated emotional and psychological problems. Institutional care for the severely defectives. Piracetam 400 to 800 mg. t.d s. given for 3 to 6 months has also been found to improve concentration and learning ability of the retarded children.

## 8. PSYCHIATRIC DISORDERS OF CHILDHOOD

All the types of psychiatric illnesses seen in adults are observed in children also, though the symptomatology may be different in the two groups.

**Classification:**

1. Psychosis:
   (a) Organic e.g. encephalitis, meningitis, chorea, general paralysis of insane, etc.
   (b) Functional e.g. schizophrenia, depression and mania.
2. Neurosis—anxiety reaction, phobic reaction, obsessive compulsive reaction and hysteria.
3. Psychosomatic illnesses e.g. bronchial asthma.
4. Mental subnormality or deficiency.
5. Epilepsy.
6. Behaviour problems of children—
   (a) Antisocial e.g. stealing, lying, begging, truancy from home, loafing, drug addiction, alcoholism, sexual perversions, criminal offences, other delinquency traits.

especially with umbilical catheterization, endotracheal intubation. 4. Underlying diseases or defects—RDS, malformations, e.g. meningomyelocele. 5 Diagnostic and therapeutic procedures—umbilical catheters in exchange transfusion, endotracheal intubation, ECG leads, IV scalp veins or catheters. 6. Dust—Staphylococci, hands of personnel, stored solutions, water in sinks, humidifiers, etc.,—Gram negative infections. 7. Host defences of newborn—Poor cell mediated lympholysis, poor delayed hypersensitivity due to poor inflammatory response, defective complement synthesis and macrophage function and chemotaxis. 8. Artificial feeding—lack of protective breast milk factors.

**Clinical features :**

1. *Constitutional*—Fever, hypothermia, poor feeding, lethargy, sclerema.
2. *G.I.*—Abdominal distension, vomiting, diarrhoea, hepatomegaly, paralytic ileus.
3. *Respiratory*—Recurrent apnoea, dyspnoea, grunting, flaying of nostrils, intercostal and subcostal indrawing, cyanosis.
4. *CVS*—Pallor, mottling, cool skin, hypotension, tachycardia.
5. *CNS*—Irritability, tremors, seizures, depressed neonatal reflexes including Moro's reflex, irregular breathing, tense fontanella.
6. *Haematologic*—Jaundice persistent, splenomegaly, petechiae, purpura, bleeding.

**Diagnosis :** 1. *History*—of predisposing factors, examination of mother and placenta. 2. *Laboratory tests*—(a) Recovery of organism from blood, urine, CSF, umbilicus, exposed areas by Gram staining. (b) Viral isolation techniques—throat swab, urine, stool, blood for Australia antigen. (c) Serologic tests—TORCH titre (Toxoplasma, Other, Rubella, Cytomegalus, Herpes). (d) Other screening methods—Raised IgM levels in newborn (IgG passively transferred by placenta but not IgM). Total white cell count $< 5000$/cmm, elevation of absolute band count of neutrophils very significant, toxic granules in neutrophils, thrombocytopenia (vital infections), raised micro-ESR and C-reactive protein, high polymorph count in umbilical cord sections or gastric aspirates. 3. *Radiographs*—Suspected pneumonia, osteomyelitis, arthritis, congenital syphilis.

psychologist investigates each child, socially and psychologically and formulates a dynamic diagnosis. The child is treated through individual psychotherapy and/or group therapy called play therapy. In addition, the child is given drugs whenever indicated e.g. aggressive children may have to be given sedatives, tranquillisers or neuroleptics to quieten them. Enuretic children may be given antidepressants. The child attends 50 to 60 play therapy sessions spread out over a period of 4 to 6 months, usually 2 sessions per week.

Under certain circumstances such as when the child's problems are antisocial or the physical environment is pathological, temporary institutionalization of the child becomes necessary; the treatment of the child and parents is carried out as usual. The child is sent back to his home after things have improved.

*Of parents*—Treatment of the parents or parent substitute is equally or perhaps more important since in a great majority of the cases, "there is no problem child but there are problem parents" The parents are helped, through individual and group counselling and therapy, to understand the causes of the child's problems in terms of their unhealthy relationship with the child and modifying their abnormal attitudes. Thus co-operation of parents is most important in the treatment of the child's problems. When the parents improve upon themselves, the child's improvement is more or less automatic.

## 9. EPILEPSY AND PSYCHOLOGICAL COMPLICATIONS

DEFINITION—Epilepsy can be defined as a paroxysmal disturbance of brain functions such as consciousness, motor, sensory, visceral, emotion and behaviour.

PSYCHOLOGICAL COMPLICATIONS—Epilepsy is known to be precipitated by emotional disturbances and mental tension. Also, uncontrolled and partially controlled cases of epilepsy develop psychological complications—

1. Dementia.
2. Personality changes (Epileptoid personality).
3. Paranoid psychosis.
4. Reactive depression.

INVESTIGATIONS—Psychological tests of intelligence, memory, cognition and personality are helpful in confirming the clinical diagnosis.

## 8. CONGENITAL SYPHILIS

### Clinical manifestations:

**Early congenital syphilis—**

1. *Constitutional symptoms—*

   Anaemia, wasting, fever, fretfulness.

2. *Local symptoms—*

SYMPTOMS IN INFANCY—

1. *Marasmus*—Infant undersized, puny and marasmic with a wrinkled face and wizened appearance.
2. *Mucocutaneous lesions—*
   (a) Snuffles—due to rhinitis. It may be present at birth or appear after few weeks. The nose may become blocked and this may interfere with breathing.
   (b) Laryngitis—causing the cry to be hoarse.
   (c) Skin rashes—(i) Maculopapular, circular, slightly elevated, and does not itch. The rash at first is bright red but gradually fades to a brownish colour. It may involve the entire body or be confined to the face, back and extremities. The rash and subsequent flaking on the soles and palms may give rise to a highly glazed appearance of the skin. (ii) Linear cracks or ulcers radiating from the mouth and anus. They are moist and produce fissuring and bleeding. Condylomata or raised greyish masses close to the anal margin or around the anus and female genitalia. (iii) Syphilitic pemphigus—sometimes the skin may be raised into blisters containing thin seropurulent fluid. (iv) Syphilitic onychia.
3. *Hair*—Eyebrows disappear, excess hair on head (syphilitic wig).
4. *Visceral*—(i) Liver usually enlarged, may extend to the umbilicus; firm, smooth and not tender. Jaundice indicates severe infection. (ii) Spleen—slightly enlarged. (iii) Kidneys—occasionally albumin, casts and blood cells in urine, rarely generalised oedema. (iv) Lungs—Pneumonia alba. (v) Orchitis.
5. *Ocular*—iritis and choroiditis.
6. *Nervous system*—(i) Meningitis. (ii) Hydrocephalus.
7. *Bones*—(i) Osteochondritis—Swelling and tenderness at ends of long bones, and in severe cases separation of

## 2. PEDICULOSIS

**Types of infection:** Man can be infected by lice on the head (Pediculus humanus capitis), on the body (P. humanus corporis), and in the pubic area (Phthirus pubis).

**Clinical features:**

*Pediculosis capitis*—produce an itchy dermatosis of the head and neck The grain-like quality of the nits can be appreciated by palpating between the thumb and index finger.

*Pediculosis corporis*—Body lice are rare except in vagrants who sleep in their clothes and people with low standards of hygiene. The lice and their eggs are usually found in the seams of clothing. Since lice cause irritation there may be small red papules with a tiny central clot. Occasionally there is general or local urticaria or thickening and discolouration of the skin. Scratching may lead to eczema or impetigo.

*Pediculosis pubis*—Apart from the pubic area, pubic lice may be found on the eyebrows, eyelashes or underarm hair. They are usually spread by direct contact but may be acquired from clothing or lavatory seats. The signs are similar to pediculosis corporis.

COMPLICATIONS—Secondary infection, lymphadenitis, urticarial rash.

**Management:**

*P. corporis and P. pubis infestations*—(a) Regular bathing and changes of clean clothing (b) Gamma benzene hexachloride (Lorexane) application rubbed into affected areas twice weekly. DDT is not recommended because of its persistence and toxic effects.

*P. capitis infestation*—One of the following can be applied—(i) *Gamma benzene hexachloride*—1% cream is massaged into the scalp and left for 24 hours, or Cream containing 2% gamma benzene hexachloride in a detergent base is applied to wet hair, rubbed in vigorously for 4 minutes and the hair then rinsed and combed with a fine comb, or 1% in shampoo base is applied to the scalp. Treatment should be repeated in seven days. (ii) *Malathion*—0 5% lotion effective in treating new resistant strains of lice.

## 3. FUNGAL INFECTIONS

DEFINITION—Fungal infections are caused by non-photosynthetic vegetable parasites called fungi.

SYMPTOMS ACCORDING TO AGE—

*At birth* . . . Pemphigus, progeric appearance, syphilitic wig, pneumonia, osteochondritis.

*3-4 weeks* . . . Skin eruptions, choroiditis, otitis, hemorrhage from umbilicus, nose, or fissures.

*3-4 months* . . . Epiphysitis, fissures at lips and anus, condyloma, hepatomegaly and splenomegaly, gumma of testis.

*6 months-1 year* . . . Uveitis, bossing of skull.

*1-2 years* . . . Dactylitis, mental deficiency, hydrocephalus.

*Late manifestations* . . . Interstitial keratitis, deafness, periostitis of long bones, Clutton's joints, tertiary lesions of skin and mucous membrane, paroxysmal hemoglobinuria, neurosyphilis.

STIGMAS OR HALL-MARKS OF PREVIOUS LESIONS OF CONGENITAL SYPHILIS—

*Mucocutaneous*—Rhagades—peribuccal cicatrices radiating from mouth. Mucous membranes—saddle nose, perforation of palate.

*Bones and joints*—Bossing of head. Hydrocephalus. Sabre shin.

*Hutchinson's triad*—(i) Eyes—keratic scar, chorioretinitis, pupillary changes, optic atrophy. (ii) Ear—deafness. (iii) Teeth—Hutchinson's teeth, mulberry molars.

*Constitutional defects*—Syphilitic facies. Dwarfism and infantilism. Mental deficiency.

**Treatment:** Procaine penicillin in aqueous suspension daily for 10-14 days in dose of 50,000 u/kg.

## 9. INFANT FEEDING

**Breast feeding:**

*Advantages*—

1. Breast fed infants are less prone to diarrhoea because—(a) Milk is free from contamination. (b) It contains secretory IgA and some other substances which offer the first line of defence against bacterial invasion of the gut. (c) Stools are acidic and not conducive to growth of E Coli
2. Breast milk is easily digestible because it contains less casein and more lactalbumin compared to cow's milk. Thus the curd tension is lower.
3. It contains less solute load, which is advantageous for the immature kidneys.

clearing in the centre. (2) Inflammatory type—This is a deeper type with pustules and kerion formation. The condition should be differentiated from sycosis barbae.

**Tinea corporis**—Ringworm of the glabrous skin can occur anywhere on the body. It is caused most often by trichophyton species. The lesion starts as a papule which spreads peripherally with central clearing. The lesions are usually circinate with an active border consisting of vesicles and scaling. D.D.—Tinea versicolor, pityriasis rosea, secondary syphilis, seborrhoeic dermatitis, psoriasis.

**Tinea cruris**—Ringworm of the groins and upper and inner parts of the thighs. Obesity, moisture, warmth and frictions are the important factors for its existence. It spreads to the buttocks, and lower abdomen. It is associated with itching. D.D.—Ecthyma, seborrhoeic dermatitis, intertriginous psoriasis, pemphigus vegetans, circumscribed neurodermatitis.

**Tinea pedis and manum**—It is a common infection in hot humid climates. It is very pruritic, vesicobullous in nature, and occurs on the instep and plantar surface of the foot. The fungus is acquired from the flooring, shoes and socks. Between the toes it causes maceration especially of the space between the fourth and fifth toes, and may result in fissuring and secondary infection at that site. Sometimes the only evidence is a chronic hyperkeratotic scaling eruption with minimal infiltration.

**Onychomycosis**—Fungal infection of the nails is characterised by brittleness, friability and thickening of the nail. The infection usually starts at the free margin and lateral border of the nails and progresses towards the nail fold. There may be a tinea infection on other parts of the body. A single or few nails of one or both feet or hands may be involved. The condition should be differentiated from psoriasis of nails and candida infection.

**Management:**

PROPHYLAXIS—

1. Patients who sweat a lot should change their clothes frequently, wear cotton socks and avoid synthetic material.
2. Clothes, especially the underwear, and towels should be boiled in hot water.
3. Footwear should be of the open type permitting sufficient aeration.
4. Intertriginous areas should be kept dry with powders like talcum or an antifungal powder.
5. Shampoo the hair immediately after a visit to the barber's shop.

## ORGANIC PSYCHOSIS (ORGANIC BRAIN SYNDROME)

**Clinical manifestations:** They are grouped into (1) basic or essential symptoms, and (2) accessory or individual symptoms

1. Basic symptoms are observed in every case of organic psychosis, though the degree may vary.
2. Accessory symptoms depend on the factors peculiar to the individual i.e. they are derived from his personality, and his previous psychological experiences. Personality traits may become exaggerated e g. a thrifty person becomes miserly.

**Basic symptoms:**

1. Inability to grasp, retain and recall new impressions resulting in loss of memory (amnesia) for recent events Memory for remote events may be unaffected till a very advanced stage.
2. Disorientation of time, space, person and self.
3. Poverty of attention or distractibility.
4. Impaired comprehension and judgement.
5. Intellectual deterioration (Dementia)—Patient cannot carry out simple arithmetic problems like additions of 7s or subtraction of 7 from 100 and so on Cannot understand the meaning of commonly used proverbs like "look before you leap," "stitch in time saves nine", etc. Cannot observe the similarities and differences between the objects of daily use.
6. Circumstantiality (i.e. talking besides the point) and confabulation (i.e. story making) to cover up his intellectual deterioration and amnesia for recent events.
7. Emotional lability ("incontinence"). Patient is easily provoked to anger, tears or laughter. Sometimes patient becomes foolish and facetious.
8. Loss of control over instinctual urges. Patient may show thieving propensities or sexual excesses.
9. Narrowing of interests, self-centredness, perseveration, preoccupation with body functions, i e. hypochondriasis.
10. Care of person, social relationship and manners deteriorate
11. Disturbances of consciousness of varying degrees like clouding of consciousness, delirium, twilight state or trance, stupor, etc.
12. Increased purposeless psychomotor activity (agitation) and excited, rowdy, violent, abusive, destructive, assaultive behaviour.

complete heart block, Adams-Stokes attacks, sick sinus syndrome.

3. *Reflex syncope*—Cardiac standstill occurring from reflex vagal activity, e.g following distension of viscera, fainting associated with irritation of pleura or peritoneum, cardiac asystole associated with oesophagoscopy or bronchoscopy, and in glossopharyngeal neuralgia and cardiospasm, and pathological lesions in larynx and mediastinum.

C **Syncope due to metabolic causes—**

1. *Hypoxia*—Oxygen lack may occur at high altitudes, or at lower levels of altitude in patients with aortic stenosis, congenital heart disease, pulmonary hypertension or anemia. There may be cyanosis at onset of impairment of consciousness followed by convulsions. In some subjects, breathing gas mixture with a low $O_2$ content can precipitate syncope. It is also one of the factors which may precipitate syncope during administration of nitrous oxide for dental procedures.

2 *Hypoglycemia*—in diabetic patient, or spontaneous due to insulin secreting tumor of pancreas. Tendency to occur after prolonged period of starvation. Associated with profuse sweating, prompt relief after administration of glucose.

3 *Hyperventilation syndrome*—of organic or functional origin. Usually develops slowly and follows more common manifestations such as paraesthesiae, visual disturbances and tetany.

D **Hysterical syncope—**

This is a type of loss of consciousness of psychologic origin. It occurs without alteration of pulse or blood pressure.

**Management**—(a) *Vasovagal attacks and syncope in general*—Immediate treatment is to place the patient at once in recumbent position in order to restore sufficient B.P. for cerebral perfusion to be resumed. (b) *Cough syncope*—Vigorous treatment of chest condition with antibiotics and antitussive drugs. (c) *Micturition syncope*—Patient on waking at night must be advised to sit on edge of the bed for a short period before going to lavatory. He should be encouraged to micturate in the sitting position. (d) *Carotid sinus syndrome*—Anticholinergic drugs or if this fails surgical denervation of carotid sinus. (e) *Postural hypotension*—External support by elastic stockings or antigravity suit and fluorohydrocortisone by mouth. Etilefrine for preventing L-Dopa-induced hypotension in Parkinsonian patients.

A. ACUTE ORGANIC PSYCHOSIS (Acute brain syndrome) :

1. Intracranial infections e g. meningitis, encephalitis and systemic infections (Delirium).
2. Drug intoxication e.g. barbiturate, bromide, isoniazid, LSD-25, cortisone, alcohol intoxication (Delirium tremens, acute hallucinosis), heavy metals like lead and mercury, and poisons like carbon monoxide.
3. Head injury (concussion or contusion).
4. Circulatory disturbances like C.C.F.
5. Epilepsy.
6. Metabolic disturbances like cholemia, uremia, hypoglycemia, and electrolyte disturbances.
7. Brain tumors.
8. Endocrine disorders like hyperthyroidism.

B. CHRONIC ORGANIC PSYCHOSIS (Chronic brain syndrome):

1. Congenital cranial anomaly, spastic paraplegia, mongolism
2. Infections of brain due to syphilis (G.P.I.), meningoencephalitis.
3. Intoxication with drug (e.g. barbiturate, amphetamine), poison and alcohol (Korsakoff's syndrome and chronic alcoholism).
4. Injury to brain—birth trauma, head injury, following brain operation.
5. Circulatory disturbances e g. arteriosclerosis.
6. Epilepsy.
7. Senility.
8. Presenile degeneration of the brain like Alzheimer's disease. Pick's disease, etc.
9. Deficiency states e g pellagra, Wernicke's syndrome, psychosis associated with pernicious anaemia.
10. Brain tumors.
11. Metabolic and endocrine disorders e.g. hypocalcemia. Cushing's syndrome, adrenogenital syndrome, myxoedema.

**Management:** This would vary with the type i.e. acute or chronic and with the cause. In general the principles of treatment are—

1. Replenish fluids, electrolytes and attend to the nutrition of the patient particularly in the acute type
2. Symptomatic treatment to calm the patient with sedatives and hypnotics like phenobarbitone sodium 30 to 60 mg t.d s , chloral hydrate 1 0 gm., Inj. Paraldehyde 6 to 8 ml I M. or neuroleptics like chlorpromazine 25 to 50 mg. t.d s., trifluperazine 2.5 to 5 mg t d s., haloperidol 0 25-1 5

The patient may in early stages complain of distortion of vision and later complete central blindness. Diagnosis is made by fundoscopy—excessive pigmentation of macular region, atrophy and exudates Hemorrhages may be present. (b) *Retinitis pigmentosa*—There is primary degeneration of the neuroepithelium of the retina on a hereditary basis. The symptoms are night-blindness and a gradually increasing concentric limitation of the visual fields. Ophthalmoscopy reveals pallor of optic disc, narrowing of retinal arteries and veins and pigmentary deposits in the retina.

6. OPTIC ATROPHY—The essential symptom is visual deterioration. Optic atrophy may be—(a) *Primary*—as occurs characteristically in tabes dorsalis or hereditary optic atrophy. On ophthalmoscopy the disc is gray or white with sharply outlined edges. The lamina cribrosa usually can be seen at the bottom of the physiological cup. (b) *Secondary optic atrophy*—may result from head injury, optic neuritis, retrobulbar neuritis, pressure from orbital and cerebral tumors or large aneurysms, after-effects of papilloedema due to increased intracranial pressure and certain poisons like lead, tobacco, quinine, etc. The disc is gray or dirty gray or grayish red in colour The physiological cup is blurred and often non-existent. It is not possible to see the lamina cribrosa and frequently there is tortuosity and narrowing of the veins.

7. TOXIC AMBLYOPIA—Continuous use of substances like tobacco, methyl alcohol, arsenic, ergot or lead may cause damage to the optic nerve and progressive visual failure. Tobacco amblyopia is the commonest. Red and green colours often cannot be distinguished before the vision for white is reduced. Trouble with reading is an early complaint. The fundus is normal but in some cases a temporal pallor of the optic disc may be seen. Chloroquine may cause irreversible retinal damage leading to blindness.

8. UVEITIS—An inflammation of the iris, ciliary body and choroid may present with acute onset of pain and dimness of vision, or an insidious onset with only slight blurring of vision Slit-lamp examination of the eye will show keratic precipitates on the back of the cornea, vitreous opacities and posterior synechiae. The acute cases usually subside soon but chronicity may lead to lens opacities, macular oedema and even softening and shrinkage of the eyeball with resulting failure of vision.

2. Personality · 64% of the schizophrenic patients are of schizoid personality, i e. individuals who are asocial, shy, reserved, eccentric, oversensitive, fond of books and nature and having very few friends. Their body structure (physique) is asthenic type.
3. Childhood development and parent-child relationship. Broken homes, divorces, overprotection or rejection by the parents are alleged to be more common in the life histories of schizophrenics.
4. Age The peak incidence is between the age of 15 to 35 years, though the illness is reported before 15 years and after 35 years also.
5 Sex : Equal incidence in both sexes, though one type may be more common in one sex than the other.
6. Social isolation: Predisposed unstable persons tend to choose a career which leads to social isolation and difficulties in inter-personal relationship which in its turn leads to the development of schizophrenia.
7. Intelligence: People with low intelligence are more predisposed to schizophrenia.
8. Overcrowding, slums, etc.. Incidence of schizophrenia is very high in such physical environments.
9. Precipitation : Predisposed individuals under any conditions of stress (physical, physiological like infective disease, pregnancy, child birth, or psychological), breakdown into schizophrenic psychosis.
10. Endocrine, Biochemical and Metabolic disturbances (particularly adrenaline and other essential catecholamines) incriminated but not proved.

*Psychopathology*: Not clearly understood. The illness is probably a phenomenon of regression i e. reversal to infantile and childhood patterns of psychological living, a state of organization where reality does not exist Thus the patient attempts to resolve his psychological conflicts by denying the harsh and painful reality world and living in a phantasy world full of pleasures

**Clinical manifestations:** Consciousness, orientation and memory are the mental functions undisturbed. Higher artistic qualities are easily affected Thinking, emotions and behaviour are disturbed in a characteristic way. In addition, there may be disturbances of will or volition, perception, motility and attention. The patient is detached from reality and manages to live in two worlds—reality world and phantasy world, at the

nial hypertension or with tumors in the posterior fossa or within the ventricular system. There is usually other evidence of raised intra-cranial pressure and permanent visual loss is usually preceded by transient episodes of obscuration of vision.

7. *Poisons*—Methyl alcohol. It induces an acute optic neuritis. Quinine.
8 *Eclampsia*—may be responsible for acute loss of vision during pregnancy.
9. *Acute glaucoma*—Pain in eye and brow with rapid loss of sight and reflex abdominal pain and vomiting.
10. *Vascular occlusion*—occasionally in elderly patients. Thrombosis (actually capillary oozing) of central retinal artery. The central fundus shows retinal pallor with a cherry-red spot at the fovea A similar change in fundus is produced by carotid insufficiency where there may be episodic visual loss and evidence of cerebral changes.
11. *Cranial arteritis*—Severe and continued headache, often band-like, sometimes associated with cramps in the legs or abdominal pains. Sudden blinding in one eye with only minimal changes in the fundus may be followed soon by a similar disaster in the other eye. ESR often very high.

## TRANSIENT VISUAL LOSS

1. *Obscuration of vision*—with raised intracranial pressure. Episodes of visual loss affecting one or both eyes and lasting 5-10 seconds.
2 *Amaurosis fugax*—caused by circulatory disturbance either unilateral (ophthalmic artery) or bilateral (middle and posterior cerebral arteries). Platelet emboli, usually originating from atheosclerotic plaques in the carotid arteries are responsible.
3 *Uthoff's phenomenon*—occurs with demyelinating diseases of optic nerves. Patient notices diminution of vision associated with a rise in body temperature, e g after taking a hot bath or exercise.
4. *Migraine*—with classical migraine there is periodic, partial and recurrent transient loss of vision with scintillation, hemicrania and sometimes nausea and vomiting.

5. *Disturbances of perception*—Hallucinations are more common than illusions. Auditory variety is the commonest. Gustatory, olfactory and kinesthetic hallucinations are also complained of. Visual hallucinations are rare. The hallucinations can be structured (i e. human and animal voices) or unstructured (i.e. vague noises).
6. *Disturbances of motility*—Commonest is catatonia. The usual symptoms are increased psychomotor activity or excitement, stupor, negativism, automatic obedience, stereotype, perseveration, mannerism, mutism, verbegeration (i e repeating the same word), postures and cerea flexibilitas (i e. wax like state of the body which permits the body parts to be put into odd shapes).
7. *Disturbances of attention (Autism)*—Excessive day dreaming or phantasy living, muttering, spells of laughter and crying without reason. Childish behaviour (regression)—patient passes urine and stools in clothes, plays with his own excreta, etc. Absent mindedness. Mistakes in work.

DIAGNOSIS OF EARLY SCHIZOPHRENIA :

1. Change of personality and temperament, e g. schizoid person becomes more schizoid.
2. Awkward, eccentric and unexplained behaviour.
3. Change in work habits, absentism, neglect of work, reduction in efficiency and productivity.
4. Emotional blunting, callousness.
5. Tendency to autism i e. day dreaming and absentmindedness
6. Neglect of personal toilet, social obligations and responsibilities.
7. Sudden but pseudo interest in religion, philosophy, metaphysics, etc.

**Types of Schizophrenia :** No accurate classification is possible because symptoms of one type may be observed in symptoms of another type. Broadly two types are recognized :

A. TYPICAL—

1. *Simple schizophrenia*—occurs around the age of 15 to 20 years. Slow onset, more common in males than females. Affect disturbances viz blunting of affect is most marked; autism, social unresponsiveness, thinking disturbances and behaviour disturbances are also present. Delusions and hallucinations are rare. Prognosis not good.

| *Food sources, daily requirement, therapeutic dose and toxic effects (if any)* | *Symptoms and signs of deficiency* |
|---|---|
| thirst and headache. Hypercalcemia causes calcium deposition in tissues and kidneys which may lead to renal failure | 5. Resistance to vitamin D—Generalised tubular damage (Fanconi syndrome), renal tubular acidosis. |
| **Vitamin E**<br>Alfalfa, wheat germ oil, lettuce, maize, mollases, peas, whole rice, meat<br>30 mg. | Anemia.<br>Used for—nocturnal muscle cramps, intermittent claudication. |
| **Vitamin K**<br>Green vegetables, alfalfa, spinach, cabbage, egg yolk, tomatoes. $K_1$ synthesised by bacteria in intestines<br>Exact daily requirement not known | Haemorrhagic diathesis due to diminished prothrombin. |

## Water soluble vitamins

| | |
|---|---|
| **Vitamin B complex**<br>VITAMIN $B_1$ (Thiamine)<br>Yeast, meat, whole grain cereals, beans, liver, egg yolk, potatoes. (Synthesised by microorganisms.)<br>1-5 mg.<br>50-100 mg.<br>Occasional allergy | Beriberi—<br>(1) Wet beriberi (Beriberi heart disease).<br>(2) Dry beriberi (peripheral neuropathy) and Wenicke-Korsakoff syndromes. |
| VITAMIN $B_2$ (*Riboflavin*)<br>Milk, eggs, liver, germinating seeds<br>2 mg.<br>5-10 mg. | Angular stomatitis, palpebritis and cheilosis. Fine scaly, slightly crusty desquamation on alae nasi and on and about the ears<br>Purple or magenta glossitis<br>Corneal vascularization<br>Scrotal dermatitis |

of schizophrenia: Catatonic and Paranoid carry good prognosis. Schizoaffective also carries good prognosis. Simple, Hebephrenic, Childhood, Juvenile and Pseudoneurotic types do not carry good prognosis. 3. Personality: Nonschizoid personalities respond better than schizoid personalities. 4. Precipitating factors: Presence of precipitating factors carry better prognosis. 5. Age—Schizophrenia between the ages of 20 to 30 years carry better prognosis than schizophrenia occurring at other ages. 6 Type of onset: Acute onset carries better prognosis than gradual onset 7. Number of attacks, and family history of mental illness affect the long term prognosis i.e. relapse rate will be high.

**Management:**

1. *Drug therapy*—(a) Antipsychotic drugs (Neuroleptics)—Phenothiazines, butyrophenones, thioxanthine derivatives, dibenzene derivatives, indole derivatives and Rauwolfia compounds are the specific antipsychotic drugs. (b) Sedatives and hypnotic drugs—like phenobarbitone sodium, chloral hydrate, paraldehyde etc. are indicated when the patient is excited, rowdy or restless. Hypnotics, both barbiturate and non-barbiturate types are given when the patient is sleepless. Indications· (i) Early schizophrenia (ii) Additional treatment, along with E C.T. and insulin therapy. (iii) Chronic and refractory schizophrenia. (iv) Maintenance therapy for recovered patients. These drugs can be administered orally or parenterally. The commonly used drugs are: Chlorpromazine hydrochloride (150 to 300 mg per day, maximum dose upto 3,600 mg per day), Trifluperazine (10 to 15 mg per day, maximum dose upto 120 mg. per day), Triflupromazine (150 mg. to 400 mg. per day), Thioridazine hydrochloride (150 mg. to 300 mg. per day, maximum dose 800 mg. per day), Prochlorperazine (100 to 300 mg. per day), Chlorprothixene (150 mg. to 400 mg per day), Reserpine (9 to 12 mg. per day), Butyrophenones like Haloperidol (4.5 to 9 mgm. per day), trifluperidol (3 to 6 mg /day), and Inj. Fluphenazine 6 25 mg to 25 mg IM/, once or twice a week are also used. These drugs have proved very useful in the management of the patients and considerably reduced the need for other therapeutic measures as well as hospitalization. Though the use of these drugs is sometimes associated with dramatic side effects, like the extrapyramidal system involvement, on the whole they are quite safe even for prolonged use.

2. *Convulsive therapy* (electrical or chemical)—About 6 to 10 convulsions spread out over a period of 4 to 6 weeks Indications: (a) Catatonic and Paranoid schizophrenia. (b) Stupor,

2. *Skin*—Dermatitis begins as bright-red erythema like sunburn on exposed parts, or parts subject to pressure such as front of neck (Casal's necklace), back of hands, forearm, dorsum of feet and ankles. Bilaterally symmetrical and sharply demarcated from adjacent normal skin (hyperkeratotic border of Merk). The lesions are never static; they either advance or regress. In acute cases vesicles and bullae might be seen; in chronic cases, the skin is scaly with characteristic "crazy pavement" appearance over hands and legs Hyperkeratosis over bony prominences.
3. *Nervous system*—Irritability and loss of power of concentration. In acute cases delirium, and in progressive chronic cases dementia Ataxia, spasticity and loss of sphincter control may occur due to postero-lateral degeneration of the spinal cord. Pellagrous encephalopathy—a process of acute cerebral disturbances responding to nicotinic acid may occur in alcoholics and in chronic illness.
4. *Other symptoms*—(i) Genito-urinary—Burning micturition, decreased libido, hypomenorrhoea. (ii) Circulatory—subnormal B.P., tachycardia and collapse in severe cases. (iii) Blood—macrocytic or microcytic anemia. (iv) Vaginitis.

**Differential Diagnosis:** Pellagra-like skin lesions can occur in the following—(1) INH therapy—due to pyridoxine deficiency because pyridoxine is required for the conversion of tryptophan to niacin (2) Malignant carcinoid syndrome—Here tryptophan is converted to 5HT instead of niacin thus causing pellagra. (3) Hartnup's disease—Absorption of tryptophan is affected due to inborn error of metabolism

**Management:**

1. *General*—(i) Protect the skin by avoidance of direct sunlight and all sources of mechanical irritation. If dermatitis is severe, apply solution of potassium permanganate (1:5,000) (ii) Rest in bed in severe cases till skin lesions have disappeared.
2. *Dietetic*—4,000 or more calories daily with 150-200 gm. protein in the form of meat, eggs, four pints of whole milk with added dry skimmed milk, whole wheat cereal, 150 gms. or more of brewer's yeast, fresh vegetables and fruits.
3. *Specific*—Nicotinamide 500 mg. daily. Nicotinic acid is avoided because of its vasodilatory effect. Vitamin C and iron.

2. Constitution and Physique: Pyknic body build is more commonly associated with Manic Depressive Psychosis whereas Involutional Depression is more often seen in asthenic persons.

3 Temperament: Cyclothymic temperament (i.e. swings of mood-elation and dejection) is more often observed in patients diagnosed as Manic Depressive Psychosis.

4 Personality: Melancholic, anxious and obsessional personalities are more predisposed to this illness.

5. Season: Incidence of depression is reported to be high in summer months.

6. Age: Onset of the illness is usually after 25 to 30 years, the peak being between 40 to 60 years, though there are reports of children suffering from this illness also.

7. Sex: Both the sexes are affected, though there is variation as far as the type of depression is concerned.

8. Precipitation: History of stressful environmental factors immediately preceding the onset of the illness usually available in all types of depression but more often in the reactive type than the autogenous type. Stress in any form, physical, physiological and/or psychological acting upon a susceptible or predisposed person precipitates the illness

9. Endocrine, metabolic, biochemical and electrolyte disturbances: are postulated but not conclusively proved.

PSYCHOPATHOLOGY: Not clearly understood. It is suggested that depression should be regarded as a result of anxiety in a person who experienced severe loss, real or fantasied, at an early stage of development. The loss is perceived as rejection which precipitates anger. Since these feelings cannot be tolerated, they are repressed i e buried into unconscious mind These repressed feelings of anger and hostility make the person feel guilty, worthless and depressed. Under conditions of stress, these feelings are reactivated and manifest as various symptoms of depression.

**Clinical manifestations:** The illness produces changes in soma as well as in psyche and nothing in the human organism remains the same from the inception of the illness till its termination All the systems of the body are affected to a greater or lesser degree The various symptoms can be grouped into—

1. *Physical symptoms*—These are the foremost complaints in the majority of the patients. Common symptoms are— feeling tired, listless and rundown (fatigue) insomnia,

*Investigation*—Rise in plasma osmolality and plasma sodium (to over 180 mEq/litre).

*Treatment*—Increased intake of water, if necessary IV 5% dextrose. Over-rapid replacement should be avoided as intracerebral bleeding may occur as shrunken brain tissue is rehydrated.

**Disorders of sodium metabolism:**

**Sodium excess:**

*Causes*—1. Heart failure. 2. Venous obstruction—thrombosis, neoplasm. 3. Injudicious IV saline therapy e.g. post-operative and in patients with impaired cardiac and renal function. 4. Hypoalbumaenimic states—protein malnutrition, malabsorption, cirrhosis, protein-losing enteropathy, nephrotic syndrome, peritoneal dialysis. 5. Lymphatic obstruction—neoplasm, filariasis. 6. Chronic renal failure. 7. Acute renal failure with oliguria or anuria. 8 Primary aldosteronism.

*Symptoms and Signs*: (a) Peripheral and pulmonary oedema, pleural effusions and ascites. (b) Systemic hypertension—When cardiac function is satisfactory and plasma protein concentration normal, increase in extracellular fluid volume also causes hypervolemia, which increases cardiac filling pressure and cardiac output with resultant hypertension. This occurs in primary aldosteronism and acute glomerulonephritis. (c) Oedema with signs of hypovolemia—postural hypotension, poor peripheral circulation and oliguria (which is also seen in sodium depletion) occurs in hypoalbuminaemic states.

*Investigations*—Plasma sodium is usually normal, but may be low if water is retained in excess of sodium, or raised, as in primary aldosteronism.

*Treatment*: (a) Diuretics (b) Plasma protein infusion if hypovolemia is life-threatening. (c) Aldosterone antagonist spironolactone if hyperaldosteronism as in Conn's syndrome, cirrhosis and nephrotic syndrome. (d) Haemo- or peritoneal dialysis if inadequate response to diuretic therapy particularly if the disorder of fluid and electrolyte metabolism in complex and acidosis is also present.

**Sodium deficiency:**

*Causes*—1. Excessive sweating. 2. GI fluid loss—prolonged vomiting, diarrhoea, fistulae, paralytic ileus. 3. Excessive renal loss—(a) Mineralocorticoid deficiency—Addison's disease, hypoaldosteronism. (b) Renal salt wasting—chronic pyelonephritis, renal calculous disease, analgesic nephropathy, after relief of

| *Autogenous depression* | *Reactive depression* |
| --- | --- |
| 3. Seen more commonly in persons with cyclothymic temperament and melancholic personalities. | 3. Seen more commonly in persons with anxious, inadequate or obsessive personalities |
| 4. Insomnia is of early morning type i e patient wakes up by 2 a.m. or 3 a.m. and cannot sleep afterwards. | 4. Insomnia is of early night type i e. patient finds difficulty in getting sleep, sleeps only after tossing about in the bed for long time. |
| 5 Diurnal variation of mood present Patient feels more miserable in morning than in evening. | 5. Inverse diural variation of mood present Patient feels more miserable in the evening than in the morning. |
| 6. Patient feels the same when alone or in a group. | 6. Patient feels better in a group than when alone. |
| 7. Suicidal tendencies more common | 7. Suicidal tendencies not very common. |
| 8. Psychomotor retardation more common | 8. Psychomotor agitation i e. anxiety and agitation more common. |
| 9 Relapses common in spite of adequate treatment. | 9. Relapses uncommon if adequately treated. |
| 10 E C T. and anti-depressant drugs are the principal treatments. Psychotherapy and case work are of only supportive value. | 10. Psychotherapy and case work are the principal treatments. Anti-anxiety and anti-depressant drugs also useful. E.C.T. does not give satisfactory results. |

## I. Typical depression—

**1 Autogenous depression:**

(a) PSYCHOTIC DEPRESSIVE REACTION (Severe form of endogenous depression)—Starts between the age of 25 to 30 years and is more commonly seen in women than in men The patient shows all the classical symptoms of depression, viz. sadness of mood, poverty of ideas, psychomotor retardation and symptoms of autonomic nervous system, dysthymia like early morning insomnia, constipation, dryness of mouth, anorexia, diurnal variation of mood The attack of depression lasts from 6 months to 18 months, after which the patient recovers his presickness mood state. Though there is a chance of natural remission of symptoms, one has to also remember the suicidal tendencies of these patients and therefore prompt treatment is indicated

ml of 10% solution may prevent sudden cardiac arrest. (b) IV glucose 300-500 ml 20% plus soluble insulin 1 IU/3 g glucose in 20 minutes. (c) Sodium bicarbonate 500 ml in 1.4% solution in 1-2 hours (only in absence of serious sodium excess). (d) Ion-exchange resin—Calcium polystyrene sulphonate may be given orally (15 g q.d s.) or rectally (30 g in suspension) to remove potassium from the body. (e) Dialysis is rarely required. (f) Drugs and other preparations containing potassium must be stopped

**Potassium deficiency:**

*Causes*—1. Inadequate dietary intake (rarely sole cause). 2. GI fluid loss—Prolonged vomiting, diarrhoea (colitis, laxative habit), fistulae, paralytic ileus, mucus secreting neoplasms, ureterosigmoid anastomosis. 3. Renal loss—Thiazide or loop diuretics, uncontrolled diabetes mellitus, systemic alkalosis (metabolic), renal tubular acidosis, hyperaldosteronism, cortical excess. 4. Haemo-or peritoneal dialysis.

*Clinical features*—Muscular weakness, tetany and fatiguability, thirst, polyuria, paralytic ileus and cardiac arrhythmias.

*Investigations*—Hypokalemia, raised plasma bicarbonate, low plasma chloride concentration (except renal tubular acidosis). Mild proteinuria usual. ECG changes—ST segment depression and appearance of U waves.

*Treatment*—Treatment of cause. If necessary oral potassium (20-100 mEq/day), or IV (rate of infusion not to exceed 25 mEq/hour). Care must be taken in patients with impaired renal function to avoid hyperkalaemia.

## 7. ACID-BASE DISTURBANCES

**Definition:** There is no universally agreed terminology for acid-base disturbances. Generally acidosis refers to a condition where either arterial pH is below the normal range (7.36-7.42) or would be below the range if compensatory mechanisms were not operative. Similarly in alkalosis pH is above normal or would be if compensation were absent. Disturbances related to altered elimination of $CO_2$ are termed respiratory; all others are designated as non-respiratory or metabolic.

### Metabolic acid-base disturbances:

**Metabolic acidoses:**

(1) *With high anion gap*—(a) Ketoacidosis—diabetic, starvation, alcoholic. (b) Lactic acidosis—Type A—shock (including cardiac arrest, hypoxia). Type B—biguanide,

prognosis than autogenous depression. 3. Personality—Well adjusted and healthy personality carries better prognosis than maladjusted, neurotic (i.e. obsessive, inadequate or anxious) personality. 4. Type of onset—Acute onset carries better prognosis than gradual onset. 5. Precipitating factors—Presence of precipitating factors carries better prognosis than absence of precipitating factors. 6. Number of attacks—Repeated attacks result in chronic illness.

**Management:**

1. HOSPITALIZATION—Indicated in—(a) severe attack of depression, (b) suicidal and homicidal tendencies, and (c) stuporose condition of the patient.

2. ELECTROCONVULSIVE THERAPY—About 6 to 8 convulsions spread out over a period of 2 to 3 weeks give excellent results in autogenous depression (90 to 95% success rate). Indications: (a) Severe attack, (b) Suicidal and homicidal tendencies, (c) Stupor and (d) Poor response to the other treatments.

3. DRUG THERAPY—

   (a) *Antidepressant drugs*—

      (i) *Tricyclic and tetracyclic compounds*—Imipramine or Amitriptyline or Trimipramine or Nortriptyline or Doxepin or Viloxazine (neither tri- nor tetracyclic) in daily dose of 150-300 mg. Doxepin has less of a cardiotoxic effect and is recommended for elderly patients. These drugs give good results in 70 to 80% of the patients. The drawbacks with these drugs are—2 to 3 weeks delay in the onset of action, side effects which might upset the patient more.

      (ii) *MAO inhibitors*—Phenelezine and Tranylcypromine are powerful antidepressant drugs Alarming side effects are reported. Nialamide (75 to 200 mg. per day) is a weak antidepressant.

   (b) *Central stimulants*—e.g. amphetamine sulphate (10 to 20 mg. per day), D-amphetamine sulphate (5 to 10 mg. per day) or methylamphetamine sulphate (10 to 20 mg. per day) are useful to lift up the mood since these drugs have rapid onset of action unlike the tricyclic compounds.

   (Note: 1. The tablets should be given after breakfast and after lunch. 2. The last dose should be before 2 p.m.

blunted. In metabolic alkalosis compensation by hyperventilation is poor or even absent.

1. *CVS*—In severe acidosis cardiac output falls and state of shock results. Other effects of acidosis include cardiac arrhythmias, dilatation of arterioles (particularly cerebral), vasoconstriction which may shift blood from peripheral to central circulation and increase risk of pulmonary oedema during fluid therapy.
2. *CNS*—With severe acidosis, disturbances of consciousness varying from drowsiness to coma. The excitability of neural and muscular tissues is increased by alkalosis and decreased by acidosis. Tetany may be seen in respiratory alkalosis. Alkalosis increases frequency of seizures in those prone.
3. *Metabolic effects*—Glycolysis is inhibited by acidosis and increased by alkalosis. Hepatic removal of lactase by gluconeogenesis is depressed by severe acidosis, and this may exacerbate lactic acidosis. Acute acidosis moves potassium out of cells and alkalosis encourages entry into cells; this effect contributes to the fall of plasma K which occurs during treatment of diabetic ketoacidosis. Alkalosis causes urine potassium loss. Chronic metabolic acidosis leads to negative calcium balance.
4. *Blood*—During development of acidosis, the oxygen dissocitation curve of haemoglobin is shifted to the left thereby improving $O_2$ delivery to tissues. As acidosis persists, the curve returns to its normal position Marked leucocytosis may be seen in metabolic acidosis.

DIAGNOSIS: By evaluating values of pH and $PaCO_2$, using a suitable acidbase diagram In addition the source of metabolic acidosis can often be determined by calculating the plasma 'anion gap' ($Na^+ + K^+ - Cl^- - HCO_3^-$).

**Treatment:**

1. *Treatment of primary condition.*
2. *Treatment of respiratory acidosis*—See management of respiratory failure.
3. *Metabolic acidosis*—Sodium bicarbonate—slow infusion of isotonic bicarbonate (about 800 ml/hour) and the effect assessed by re-estimation of pH and $PaCO_2$ before deciding further therapy. In cases where severe acidosis and hypokalaemia coexist, if acidosis is treated without prior or simultaneous administration of potassium salts, the hypo-

**Etiology:** Not clearly established. No one single factor held responsible. Most of the factors are similar to depression. Personality of the patients suffering from mania is hypomaniac i.e. extroverted individuals who are 'happy go-lucky' type.

PSYCHOPATHOLOGY—Not clearly understood. Probably the illness is essentially a defence, a denial against the underlying depression. Although, the patient may appear confident, he is basically overdependent. He appears friendly and outgoing, but is actually self-centered. All these attitudes are based on an emotional need for dependency relationship. When his demands are frustrated, hostility is generated. Conflicts centered around these attitudes of dependency and hostility are supposed to be the causes of symptom formation.

**Clinical manifestations:** Disturbances of mood, thinking and behaviour are the characteristic symptoms.

1. *Disturbances of mood*—Typical disturbance is 'elation' which is infectious; other states of elevation of mood like euphoria and ecstasy are also sometimes observed. The patient is boisterous, jovial, sparkling and has an excessive satisfaction with his own self and circumstances. "Never felt so better", "on top of the world", are the common expressions. Sometimes the mood is irritable and labile also.
2. *Disturbances of thinking*—Flight of ideas is the typical symptom. In this, the association between words and ideas are superficially determined, often by the sound of word (clang association) or by rhymes and puns, without any care for the intrinsic meaning. Stream of ideas is very rapid. Goal keeps on changing and the patient jumps from one subject to another. Talk is forceful and pressure of speech is raised. Conversation is impossible. Patient is argumentative and assertive. Attention is distractible and any external stimulus sets off a new train of ideas.
3. *Disturbances of behaviour*—Increased psychomotor activity is the characteristic change in behaviour. Restlessness and overactivity. Doing everything in excess. Putting into action several schemes but not completing any. Writing copiously but about trivial matters. Decorating himself extravagantly. Overactivity interferes with sleep and nutrition and exhausts the patient. Degradation of conduct (soiling and smearing), sexual assaults and exposures. Destructiveness, rowdism, criminal activities. Homicidal tendencies.

dermatitis herpetiformis-like eruptions. Pyoderma gangrenosum and erythema nodosum.

2. **Blood diseases**—(a) Defective coagulation—Petechiae or ecchymoses due to defective coagulation (b) Hemoglobinopathies—Ulcers on leg above medial malleolus.
3. **Endocrine disorders**—(a) *Myxoedema*—Dry rough skin with tendency to alopecia. Rarely xanthomata and yellowish discolouration of skin on palms and soles (xanthodermia). (b) *Hyperthyroidism*—Warm moist skin, rarely spider angiomata and palmar erythema. Pretibial myxoedema and clubbing in patients with exophthalmic ophthalmoplegia. (c) *Diabetes mellitus*—Pruritus, gangrene, trophic ulcers, xanthomata due to hyperlipemia, xanthodermia, lesions of necrobiosis lipoidica diabeticorum. (d) *Addison's disease*—Pigmentation of skin, vitiliginous patches in some. (e) *Hypoparathyroidism*—Dry, rough scaly skin and brittle nails. Moniliasis of nails common.
4. **Vascular disorders**—(a) *Hereditary hemorrhagic telangiectasia*—Telangiectatic pinpoint lesions on face, flat and spider-like on limbs, and nodular on mucous membranes. (b) *Turner's syndrome*—Webbing of neck, cutis laxa, keloid formation. (c) *Sturge-Weber syndrome*—Cutaneous telangiectasis in trigeminal nerve distribution (with intracranial malformations). (d) *Blue rubber-bleb naevus disease*—Venous malformations or cutaneous angiomata.
5. **Vitamin deficiency and excess**—(a) *Deficiency*—(i) Pellagra (ii) Scurvy. (iii) Vitamin K deficiency. (b) *Hypervitaminosis A*—Pruritus with dry scaly erythematous skin and alopecia of scalp, eyebrows and eyelashes.
6. **Drugs and chemicals**—(a) *Exanthematous eruption*—Barbiturates, chloral hydrate, antibiotics, antihistamines. (b) *Urticaria*—Tranquillisers such as meprobamate, penicillin, salicylates. (c) *Purpura*—Drugs causing aplastic anemia, penicillin, glucocorticoids, sulphonamides. (d) *Exfoliative dermatitis*—Barbiturates, arsenicals, heavy metals. (e) *Bullous eruptions*—(i) Bromides, iodides, barbiturates. (ii) *Erythema multiforme*—Sulphonamides, barbiturates. (iii) *Epidermal necrolysis*—Penicillin, sulphonamides; phenylbutazone. (f) *Fixed eruptions*—Barbiturates, sulphonamides, phenolphthalein. (g) *Acneiform*—Corticosteroids, androgens, iodides, bromides (h) *Erythyema nodosum*—Sulphonamides. (i) *Lichenoid eruption*—Antimalarials, chlorothiazide, gold. (j) *Photosensitivity*—

(ii) Lithium carbonate—1200 to 2100 mg. per day in acute attacks and upto 1000 mg/day for the maintenance of recovery. Prevention of attacks has been attempted with this drug with success.

(iii) Sedatives—Barbiturates as well as non-barbiturates, very useful in quietening down the patient.

(iv) Hypnotics—necessary to ensure good sleep.

Drugs can be administered along with E.C.T. and are very helpful in managing the patient. They have to be continued for a long time after the total remission of symptoms to avoid a relapse.

4. *Insulin therapy*—Insulin coma therapy may be tried in chronic manias when all other treatments have failed.
5. *Psychotherapy and case work*—Useful to correct the underlying psychopathology after the active symptoms have been controlled.
6. *Occupational therapy and work therapy*—useful as additional treatments.

### IV. Involutional Psychosis

**Definition**—This is a type of functional psychosis occurring for the first time in the patient's life around the period of involution (Age—45 to 55 years); corresponding to menopause in women and age of retirement in men.

*Clinical manifestations*: are of two types—

1. Involutional paranoid psychosis—Similar to paranoid schizophrenia.
2. Involutional depression psychosis—(discussed under Depression).

## 4. PSYCHONEUROSIS OR NEUROSIS

**Definition**—This is a group of mental illnesses which are described as "minor" or "benign". The patient's symptoms do not interfere with his capacity for insight and judgement, his ties with reality are intact, and his mental dysfunctions are comparatively of a milder form in contrast to psychosis (for details see differences between psychosis and neurosis). As in functional psychosis, in these illnesses also, there is no clearly defined tangible cause or structural change in brain tissue to account for the symptoms.

heralds systemic dissemination of the disease process. (e) *Mastocytosis*—Telangiectasia macularis eruptiva perstans, these appear with onset of intestinal symptoms.

9 **Connective tissue and immunological disorders**—(a) *Neurofibromatosis*—Skin fibromata (molluscum fibrosum), abnormal skin elasticity and cafe-au-lait spots in patches. (b) *Systemic sclerosis*—Glossy, waxy appearance of skin with induration of subcutaneous tissues. (c) *Systemic lupus erythematosus*—Butterfly distribution of erythema on face, patchy or generalised alopecia. Raynaud's phenomenon may occur. (d) *Polyarteritis nodosa*—Skin may be involved at times, polymorphic eruption. Vascular damage gives rise to cutaneous lesions such as nodules, hemorrhages, gangrene, ulceration and livedo reticularis. (e) *Henoch-Schonlein purpura*—Small purpuric wheals which become reddish macules occurring symmetrically on buttocks, lower back and extensor surfaces of limbs, with trunk and face generally spared A hemorrhagic component commonly supervenes. (f) *Temporal arteritis*—Skin overlying the temporal or occipital arteries may become erythematous and oedematous (g) *Angio-neurotic oedema*—involving skin and often abdominal viscera. (h) *Pseudoxanthoma elasticum*—Roughening of skin of neck or generalised cutis laxa. (i) *Ehlers-Danlos syndrome*—Hyper-extensible skin with telangiectasis and pseudotumors over pressure points (j) *Weber-Christian disease*—Tender or painless subcutaneous nodules on thighs, arms, abdomen, back and legs with recurrent fever.

10. **Systemic malignancy**—(a) *Secondary deposits* (b) *Pigmentation, pruritus, hypertrichosis or urticaria* (c) *Acanthosis nigricans.* (d) *Dermatomyositis.* (e) *Herpes zoster.* (f) *Pemphigoid.* (g) *Fixed LE-like eruptions.* (h) *Bowen's disease*—erythematous plaques which frequently undergo epitheliomatous change. (i) *Genetic syndromes*—Peutz-Jegher's, Gardner's familial tylosis and carcinoma oesophagus, phakomatoses.

## 9. LYMPHADENOPATHY

**Differential Diagnosis :**

I. **Inflammatory or Infective group :**

1. *Acute and subacute lymphadenitis*—(i) Local or generalised enlargement. (ii) Infected focus in neighbourhood of affected glands. (iii) Local heat (iv) Tenderness. (v) Fever.

| | *Psychosis* | *Neurosis* |
|---|---|---|
| 2. Insulin therapy | | |
| (a) Subcoma ... | Useful | Useful |
| (b) Coma ... | Useful | Not useful |
| 3. Abreactive therapy | Not useful | Useful |
| 4. Psychosurgery ... | Useful | Not useful |
| 5. Drugs ... | Neuroleptics, stimulants and anti-depressants commonly used | Tranquillisers (Meprobamate, chlordiazepoxide, etc.) commonly used. |
| 6. Psychotherapy | | |
| (a) Supportive | Useful | Very useful |
| (b) Analytical ... | Not useful | Very useful |
| Case work .. | Useful | Very useful |
| 7. Miscellaneous therapy like occupational therapy, work therapy, music therapy, art therapy, recreational therapy. | Useful as adjuvant | Useful as adjuvant |

**Types of neurosis:**

I. Anxiety neurosis.

II. Phobic neurosis.

III. Obsessive compulsive neurosis.

IV. Hysteria: (a) Conversion neurosis. (b) Dissociation neurosis.

V. Depressive neurosis.

Hypochondriasis and neurasthenia are according to some, neurotic disorders; others think that they are only symptoms of other psychiatric illnesses.

## I. Anxiety neurosis

**Definition:** Anxiety reaction is a neurotic state of chronic apprehension with recurrence of acute anxiety symptoms Though anxiety is a common symptom of several psychiatric illnesses like depression, schizophrenia, organic psychosis, etc., as an illness, it is characterised by certain physiological and psychological symptoms, which commonly go under the label of tension states.

II. **Reticuloses (malignant lymphomas) and blood diseases:**

(a) *Acute lymphoblastic leukemia*—(i) Children or young adults. (ii) Glands discrete, not tender. (iii) Fever moderate or high. (iv) Moderate splenomegaly. (v) Hemorrhages, stomatitis and bone pains. (vi) Diagnostic blood picture. (vii) Short course.

(b) *Chronic lymphocytic leukemia*—(i) Middle or old age. (ii) Glands large but discrete. (iii) Moderate splenomegaly. (iv) Irregular fever. (v) Hemorrhages. (vi) Skin eruptions.

(c) *Hodgkin's disease*—(i) Any age. (ii) Mostly cervical, may be axillary, inguinal, abdominal or mediastinal. (iii) Glands painless and discrete. Size varying from pea to a large orange Rubbery feel. Characteristic appearance in advanced cases is a pyramidal swelling with its base at clavicle and apex at angle of jaw (iv) Fever. (v) Pressure symptoms common. (vi) Generalised pruritus. (vii) Splenomegaly common.

(d) *Non-Hodgkin's lymphomas*—(a) *Poorly differentiated lymphocytic nodular*—(i) Age over 40. (ii) Painless adenopathy in cervical, axillary and inguinofemoral regions. In some large abdominal masses of retroperitoneal or mesenteric lymph nodes may be the presenting feature. (ii) Spleen often enlarged at onset of disease, subsequently marked enlargement producing local symptoms and hypersplenism. Favourable prognosis. (b) *Poorly differentiated lymphocytic diffuse (PDLD)*—Presents with extensive, rapidly progressing, nodal disease often with bone marrow and other extranodal involvement. Rarely disease may be confined to one nodal or extranodal site. Histiocytic and mixed lymphomas more commonly present with localized but rapidly progressive tumours. Extralymphatic involvement is not uncommon; the gastrointestinal tract, thyroid, testes and bone being the more common sites. Prognosis is unfavourable.

(e) *Follicular lymphomas*—Usually middle age. Occurs in two phases First phase relatively benign with enlargement of one or more of superficial lymph nodes, with or without splenomegaly. No constitutional symptoms. Lymph nodes moderately enlarged, discrete, firm and non-tender This phase is followed after varying period by malignant phase characterised by development of histological features of lymphosarcoma or reticulum cell sarcoma or less commonly Hodgkin's disease.

(f) *Sarcoidosis*—(i) Children or young adults. (ii) Generalised lymphadenopathy. Frequent involvement of pre- and post-auricular, sub-maxillary, epitrochlear, and para-tracheal glands (iii) Splenomegaly. (iv) Sarcoid lesions of skin, and uveitis or parotitis (v) X-

2. *Chronic anxiety reaction*—Psychological symptoms are more marked. Results in physical and mental exhaustion (neurasthenia).

**Prognosis**—Determined by: 1. Duration of illness—shorter duration carries better prognosis. 2. Personality—Well adjusted personalities recover more easily than the neurotic, maladjusted personalities. 3. Precipitating factors—Possibility of environmental manipulations to make it less stressful for the person ensures quicker and long lasting remission of symptoms.

**Management:**

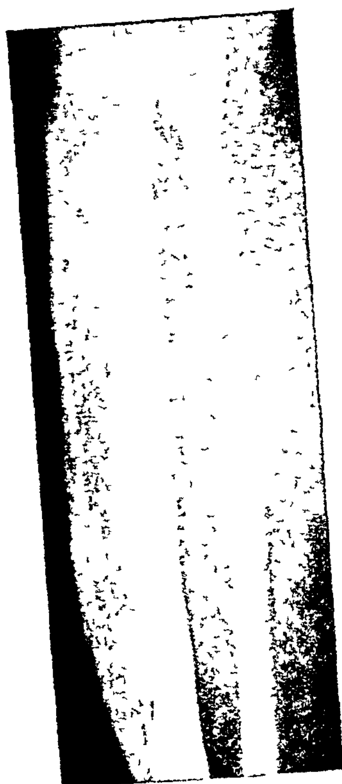
1. Hospitalization—necessary for acute reactions.
2. Drugs—Sedatives and Hypnotics are of some help. Tranquillisers like Meprobamate 200 mg. to 400 mg. t d.s., Diazepam 5 to 10 mg. t d.s., Chlordiazepoxide 10 to 20 mg. t d.s. Lorazepam— 1 to 2 mg. t d.s., oxazepam 15 mg. t.d.s. Nitrazepam—5 to 10 mg t.d.s. Hydroxizine hydrochloride 50 to 100 mg. t.d.s., give better symptomatic relief. Small doses of Neuroleptics like Chlorpromazine hydrochloride 25 mg. t.d.s. or Trifluoerazine 1 to 2 mg. t.d.s. also give good results.
3. Seminarcosis therapy—useful for acute reactions. Patient is put to sleep for 16 to 20 hours per day with the help of drugs.
4. Insulin subcoma therapy—useful in relieving anxiety and producing a sense of well being by increasing appetite which helps the patient to eat more and put on weight. 20 to 30 hypoglycemic reactions spread out over a period of 3 to 4 weeks are sufficient in majority of the cases.
5. Psychotherapy and case work—Supportive psychotherapy gives relief from troublesome symptoms in healthy and well adjusted personalities. Deep analytical psychotherapy is needed for chronic maladjusted personalities since the modification of basic psychic structure is important to get any lasting benefit.
6. Abreactive therapies like carbon dioxide inhalation therapy, IV sodium pentothal and/or methylamphetamine sulfate, hypnosis or small doses (10 to 40 volts) of electrical current passed bitemporally helps in those patients, where definite psychological trauma or feelings of guilt are important causative factors.
7. Psychophysiological therapy e.g. yoga.
8. Biofeedback techniques are also used with some success.



Rheumatoid arthritis Erosions at metacarpophalangeal joints and styloid



X-ray of the lumbar spine showing 'bamboo' appearance in ankylosing spondylitis.



Osteolytic lesions in tibia in Paget's disease

Compulsions are irresistible urges to carry out meaningless and irrational activities. If the patient does not carry out his impulse, he experiences discomfort and tension; this tension gets released only when he acts out his impulse.

**Etiology:** Incidence of obsessional reactions is not known. Also, the causes are not established. The suggested etiological factors are—

1. Heredity—There is some evidence that the disease is transmitted through genes but exact mode of transmission is not understood.
2. Age—Majority of the patients are under the age of 40 years.
3. Sex—Women seem to be suffering from this illness more often than men.
4. Intelligence—Patients suffering from this disease tend to be of above average intelligence.
5. Environmental factors—harsh and affectionless upbringing, parental disharmony, illness of the parent to whom the patient is closely attached, increase of responsibilities beyond the patient's capacities are frequently found in the histories of these patients.
6. Organic brain disorders—Encephalitis, head injury, and chorea are some of the diseases which are frequently reported in the history of past illness.
7. Personality—Commonest type is obsessive.

(Characteristics—ritualistic and rigid, perfectionist, overconscientious, meticulous, punctualist, etc.)

*Psychopathology*: According to Freud, obsessions are disguised self-reproaches in connection with incidents, usually sexual performances, which have taken place in early life. Conflict between the feelings of love and hate towards the parent who interferes with the forbidden pleasurable activities lead to states of doubt and indecision. There is displacement of affect from repressed complexes onto the symptoms, which thus act as substitutes.

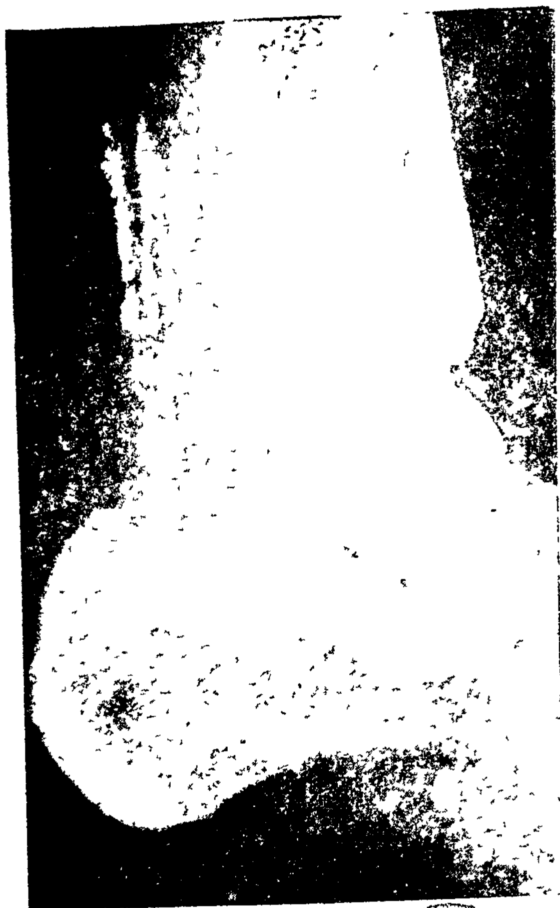
**Clinical manifestations:** Mild obsessional states are seen in normal children as well as in adults in states of fatigue or in convalescence. These are transient and usually do not interfere with comfort and working efficiency; they are important only when the degree of obsessional state is moderate or severe. The patient is aware of his obsession, regards them as foreign



Scurvy Left—Active scurvy (Tibia) White line at metaphysis, epiphysis surrounded by white ring, 'ground glass' appearance of bone Right—Healing scurvy (Humerus). Club shape due to calcification of sub-periosteal hemorrhage



Wrist joints in rickets 'Moth-eaten', ragged, saucer-shaped and widened epiphyses



Calcified guinea

and attention that the patient gets from the people around. When the tension of the unconscious mind manifests itself into somatic symptoms through the mental mechanism of conversion, the resulting illness is known as Conversion Reaction. When the tension manifests itself into psychological symptoms through the mental mechanism of dissociation, the resulting illness is known as Dissociation Reaction.

**Etiology:** There is sufficient evidence to suggest that the symptoms are psychogenic and that the environmental factors are the more important etiological factors.

1. Age—The peak incidence is between the ages of 20 to 30 years. Children and old people also show a high incidence of this illness.
2. Sex—Incidence is higher in women than men.
3. Intelligence—People with low intelligence more often suffer from hysteria.
4. Personality—Commonest is hysterical personality (characteristics—dramatizing and exhibiting, attention seeking, immature, shallow and superficial emotional relationships).
5. Marital status—Hysteria is reported to be more common in unmarried, widowed and divorcee.
6. Socio-cultural factors—Hysteria is reported to be more common in primitive, developing and less sophisticated or cultured societies.
7. Parent child relationship—History of unhappy childhood, abnormal parent child relationship, broken home or unsatisfactory relationship between the parents is more frequent in patients suffering from hysteria.

*Psychopathology*—Fundamental feature of this illness is personal inadequacy. Healthy personalities develop hysterical symptoms under conditions of severe stress or when the resistance is lowered e.g. after prolonged physical illness or head injury. According to psychoanalytical views, hysterical symptoms are symbolic representations and distorted expressions of unresolved psychological conflicts between the instinctual gratifications and the social inhibitions, in other words, id and superego. The symptoms thus provide a compromise between these antagonistic trends. At the same time, the symptoms help the patient to make the environment less stressful.

**Clinical manifestations:** There is a wide variety of somatic and psychological symptoms and it is believed that there is not a single physical illness which is not simulated by the hysterical symptoms. There are a few characteristics of these symptoms—

antigenic trigger, probably a virus, stimulates the production of auto-antibodies (IgM rheumatoid factor) against the body's own IgM immunoglobulins. This process can become self-perpetuating. Tissue damage results from immune complex deposition in the synovium and blood vessel walls, activation of complement and release of inflammatory enzymes.

**Clinical features:**

ONSET—Symptoms variable—1. Symmetrical peripheral polyarthritis (acute or insidious onset). 2 Severe early morning stiffness. 3. Arthritis of atypical distribution. 4. Tenosynovitis and/or carpal tunnel syndrome. 5. Systemic symptoms—fatigue, weight loss, and fever; acute onset of pericarditis and/or pleurisy with fever.

**Articular lesions:**

Most commonly involved are metacarpophalangeal, proximal interphalangeal joints, the wrists and the knees. In early stages joints are warm, swollen and tender. Weakening of the joint capsule and tendon along with ligament damage lead to joint instability, subluxation or dislocation and so produces characteristic deformities of R.A. Eventually severe joint damage may lead to fibrous or bony ankylosis or secondary degenerative changes Some of the characteristic joint features of RA are—(a) *Hands*—'Spindling' of proximal interphalangeal joints and swelling of metacarpophalangeal joints and dorsum of wrist. Flexor tenosynovitis and tendon nodules lead to weakness of grip or 'triggering' of fingers. Other rheumatoid features include swan-neck deformoity of fingers, boutonniere deformities of the fingers, Z-deformity of the thumbs and ulnar deviation of fingers and drop fingers from rupture of extensor tendons. (b) *Feet*—Dorsal subluxation of toes with overriding and callosities may develop. (c) *Knee*—Synovial effusion occurs early followed by fixed flexion, or varus or valgus deformities. Synovial rupture may lead to release of fluid into popliteal space and calf. Alternatively, effusion may distend popliteal bursa to produce a Baker's cyst Synovitis of bursae may occur at other sites. (d) *Cervical spine*—Subluxation of vertebral bodies or atlanto-axial joint (e) *Crycoarytenoid joints*—may occasionally be affected causing dysphagia, hoarseness or stridor.

**Extra-articular manifestations:**

1. *Skin*—(a) Palmar erythema. (b) Vasculitic rashes (often purpuric). (c) Psoriasis. (d) Drug rashes as a complication of treatment.

change in the environment relieves the stress, ameliorates the symptoms and ensures long lasting recovery.

**Management :**

1. Isolation of the patient—from the pathogenic environment is very necessary in the acute attack. The patient may have to be hospitalized and no visitors are allowed to meet the patient.
2. Placebo therapy—like some mixtures or intramuscular injections of distilled water sometimes help in relieving the symptoms because the patients are very suggestible.
3. Drugs—Chlorpromazine—50 mg. I.M. t.d.s. for 2 to 3 days. Inj. diazepam 10 mg. I M b.d. or t.d.s. helps in some resistant cases of acute hysteria by (i) removing the secondary gain and (ii) by relieving the psychological tension.
4. Abreactive therapies—Carbon dioxide inhalation therapy, IV injection of methylamphetamine sulfate (30 to 60 mg.) or sodium pentothal (100 to 200 mg.) help by providing an opportunity to the patient to discharge the tension.
5. Hypnosis—helps in relieving the symptoms by its value of suggestibility.
6. Psychotherapy and case work—are the principle treatments for hysteria. Supportive therapy gives good results in majority but deep therapy may have to be given to a few resistant cases. Family therapy in psycho-therapeutic management of the family members is also carried out to correct the family pathology.

### V. **Depressive neurosis** (See page 863).

## 5. PSYCHOSOMATIC ILLNESSES

**Definition :** Every physician recognises the role of psychological factors in the onset and course of an illness. In this sense, all diseases are psychosomatic, with the involvement of psyche and soma to a greater or lesser degree. Any physical or mental illness has its mental or physical counterpart, e g. a patient suffering from cancer or heart disease which are looked upon as predominantly or purely somatic illnesses, might also have features of anxiety neurosis of depression in mild degrees. A patient suffering from schizophrenia which is considered as mostly psychological may also show evidences of anaemia, malnutrition and vitamin deficiencies. Strictly speaking, these illnesses are not labelled as psychosomatic.

Obliterative bronchiolitis—rare complication, may be associated with penicillamine therapy.

10 *Nervous system*—(a) Entrapment neuropathies—most often median nerve compression producing carpal tunnel syndrome. (b) Peripheral neuropathy—usually sensory, occasionally sensorimotor. Vasculitis may rarerly affect large nerves producing mononeuritis multiplex. (c) Cervical cord compression—caused by cervical subluxation may cause sudden death, or more commonly progressive cervical myelopathy. (d) Cervical nerve root compression—may produce pain, numbness or paraesthisiae in arm or hand.

11. *Kidney*—No specific renal lesion. Protenuria, sterile pyuria, microscopic hematuria, casts and reduced glomerular function often occur. Analgesic nephropathy, drug-induced interstitial nephritis or chronic pyelonephritis may be seen in some cases. Secondary amyloidosis is rare but important cause of renal disease.

COURSE—Remissions and exacerbations are the hallmarks of the disease. In a small percentage however the disease progresses relentlessly to joint destruction and crippling.

**Investigations:**

1. *Haematological*—(a) *ESR*—raised in active stage. (b) *Serum proteins*—Hyperglobulinemia with elevation of gamma and alpha$_2$ globulins and hypoalbuminemia during acute phase.

2. *Immunological*—(a) Rheumatoid factor (RF)—(i) Latex screening positive. (ii) Latex test positive (Normal $<$ 20). (iii) Sheep cell agglutination test (Rose Waaler) (SCAT) (Normal $<$ 32). (iv) Differential agglutination test (DAT) (Normal $<$ 16). (b) Antinuclear antibodies (Normal $<$ 10)

3. *Special investigations*—

   (a) *Synovial biopsy*—Rheumatoid pattern (villus formation with thickening of synovial layer and infiltration with abnormal cells) in rheumatoid arthritis (also in Still's disease, SLE).

   (b) *Synovial fluid*—may show positive Rose-Waaler test in joint fluid before it can be detected in blood. Fluid may show polymorphonuclear or mononuclear leucocytes containing cytoplasmic inclusion bodies.

to surmise that emotional disturbances acting through hypothalamus can affect the sympathetic and the parasympathetic systems, resulting in alterations in the functions of the viscera to which these systems innervate. Autonomic nervous system performs two important functions in the body—(a) preparing the organism for defence in a dangerous situation and (b) controlling the internal homeostasis through the regulation of digestive, excretory, respiratory and the vasomotor processes. Sometimes these two functions become antagonistic to each other, e.g. the digestive activities of the stomach are impaired in a person facing a dangerous situation. How exactly is this brought about is easy to understand if one recollects that the automatic nervous system supplies three structures in the viscera, viz., the glands, the muscles and the blood vessels. The imbalance of the sympathetic and the parasympathetic activities would alter the functions of these three substructures. Thus, there will be hyper or hyposecretion, hyper or hypomotility and hyper-or hypomia. The end result of all these chain reactions would be the "devitalisation" of the organ, a process which would render the organ more susceptible to external or internal stimuli, both physical and physiological.

2. *Psychological theory*—The denominator here is the weakness of Ego, that aspect of self which faces the realities of the world around. The development of the personality of an individual takes place chiefly during the first few years of life. The patterns of behaviour are laid down during this formative era and the subsequent behaviour patterns are just the repetitions. It has been suggested that, amongst the individuals who suffer from psychosomatic diseases, there are present "infantile residues" and whenever these individuals meet the stresses of life which they cannot cope with adequately, there is psychological and/or physiological regression—the psychosomatic illnesses. These individuals have faced serious insecurity situations during their early years of life but have poorly-evolved mechanisms of defence to protect themselves A dynamic study of their lives reveals that they have avoided the security threatening situations and traumatic events. Whenever these defensive patterns of living collapse, they experience emotions and their physiological concomitants, similar to those of infantile and early childhood years. These reliving of the emotions results in psychosomatic diseases

SUMMARY—There is no uniformity of opinion regarding the selection of one particular organ as the channel of expression. Some believe in the genetic and constitutional weakness of the organ concerned. Others feel that a previous illness involving

5. *Ankylosing spondylitis*—More in men. Involvement of sacroiliac joints occurs early and is bilateral and involvement of spine occurs first in lumbar region and only later in dorsal and cervical areas. Involvement of more peripheral joints is relatively uncommon. Main complications are aortitis and myocarditis leading to AR and cardiac failure, iritis, atlanto-axial dislocation. Certain accompaniments of rheumatoid arthritis do not occur e g. nodules, rheumatoid factor, arteritis and peripheral neuropathy. HLA B27 antigen occurs in 90-95% of patients.
6. *Seronegative arthritis*—This is a group of arthritis characterised by a constant absence of rheumatoid factors in the serum and by an association with ankylosing spondylitis. The diseases in this group include ankylosing spondylitis, psoriatic arthritis, enteropathic arthritis (associated with ulcerative colitis, Crohn's disease and Whipple's disease), Reiter's syndrome and Bechet's syndrome.
7. *Felty's syndrome*—RA with splenomegaly and leucopenia.
8. *Reiter's disease*—Combination of urethritis, conjunctivitis and arthritis, with or without mouth ulcers, balanitis, diarrhoea and blenorrhagia.
9. *Sjogren's syndrome*—Triad of dry eyes (keratoconjunctivitis sicca), dry mouth (xerostomia) and RA.

**Management :**

I **General measures**—

(a) *Rest*—Both mental and physical. Rest in bed necessary during acute febrile stage, rapidly progressive arthritis, marked inflammation of weight-bearing joints, and presence of marked constitutional manifestations.

(b) *Diet*—Nutritious diet containing adequate calories, vitamins and minerals, and anticonstipation factors.

(c) *Correction of anemia*—Blood transfusions may be necessary.

(d) *Avoidance of cold, dampness and draughts.*

(e) *Removal of focal infection.*

II **Drug treatment**—

(1) Analgesics—may be necessary. Paracetamol (1.0-1.5 g), codeine (60-90 mg), dextropropoxyphene (65-130 mg), nefopam (30-60 mg) and pentazocine (50-100 mg) together with their variants and combinations are relatively safe for long-term use.

## 6. PERSONALITY AND CHARACTER DISORDERS

*Definition*—The illnesses included in this group are characterised by the absence of (a) any psychotic or neurotic patterns of behaviour discussed earlier, (b) any significant degree of mental subnormality or deficiency, (c) any demonstrable brain tissue damage. These illnesses disturb the harmonious social adjustment and at times, not only the patient suffers but also his family and the society. Hence these are loosely referred to as antisocial behaviour disorders

**Types :**

1. Personality pattern disturbances like inadequate, schizoid, cyclothymic and paranoid.
2. Personality trait disturbances like emotionally unstable, passive aggressive, compulsive, etc.
3. Sociopathic personality disturbances like antisocial reaction (psychopathy), sexual anomalies and perversions, addictions to drugs and alcohol.

Only the important disorders will be considered here.

### Psychopathy

**Definition**—Psychopathy refers to a persistent disorders of mind which results in abnormally aggressive and seriously irresponsible conduct—antisocial behaviour of the patient

**Diagnosis features :**

1. Unexplained failures, particularly in the job because of which patient repeatedly changes his jobs.
2. Persistent and inadequately motivated antisocial behaviour.
3. Irresponsibility.
4. Inability to distinguish between truth and falsehood, good and bad, moral and immoral.
5. Inability to accept blame.
6. Failure to learn by experience.
7. Incapacity to love.
8. Shallow and impersonal response to sex life.

It should be noted that any single feature is not of much diagnostic value but it is the cluster of these features in the life histories of the patients which is important.

**Etiology :** Several theories have been advocated but not one of them explains all the aspects of the illness fully. Among the factors accepted as significantly contributing are:

*Contraindications*—(i) In late disease when irreversible mechanical rather than inflammatory features predominate. (ii) When other disease features prevent early detection of toxicity.

*Drugs*—

(a) *Penicillamine*—Indications—Best reserved for those who cannot be managed with analgesics and anti-inflammatory drugs. Also effective in palindromic rheumatism and Still's disease. Dosage—250 mg daily initially, increased to 500 mg daily after 4-6 weeks Side-effects—Rashes, thrombocytopenia, pancytopenia, nephrotic syndrome, acute febrile reaction, myasthenia gravis and a Goodpasteur-like syndrome.

(b) *Gold*—Indications—same as for penicillamine. Also effective in psoriatic arthritis Dosage—Initial test dose of 10 mg of sodium aurothiomalate in case patient is hypersensitive. Thereafter 50 mg weekly until patient responds, usually after 3 weeks with total dose of 500 mg. Intervals between injections are then increased to 2 weeks or longer if disease remains under good control. Side-effects—Rashes, hematological complications. (Full blood count and urinalysis should be done once each month). Auranofin, oral gold salt 3 mg b d. less toxic than parenteral gold.

(c) *Azathioprine*—Indications—Same as for penicillamine particularly useful for patients who fail to respond to penicillamine. Also useful in patients with persistently active psoriatic arthropathy. Dosage—25 mg/kg/day. Side-effects—Nausea, diarrhoea, bone marrow suppression, infection e.g. herpes zoster.

(d) *Chloroquine*—Indications—As an alternative to gold and penicillamine and most suitable for patients with less severe but persistently active disease not adequately controlled with anti-inflammatory drugs. Dosage—250 mg daily of chloroquine phosphate, 200 mg of sulphate or 400 mg hydroxychloroquine sulphate. To be given for only 10 months of each year to avoid eye damage.

(e) *Levamisole*—Indications—Actions resemble those of penicillamine and is alternative to other drugs of this type for patients who develop toxic effects or fail to respond. Dose—Single weekly dose of 150 mg. Side-effects—Vasculitic rashes and neutropenia.

(f) *Corticosteroids—Indications*—(i) Patients who do not respond to adequate conservative therapy. (ii) Active rheumatoid process as evidenced by systemic reaction and demon-

activities, and intercourse per rectum are not rarely observed in well adjusted persons. Normal or abnormal has therefore to be considered in terms of an individual's social background. Age is another important variable.

Concerns about sexual functions like masturbation, nocturnal emissions and premature ejaculations are common in adolescents and young adults, unmarried as well as married. Spermatorrhoea i e. complaints about passing semen in urine is another frequent symptom. These often lead to feelings of tension and guilt which in their turn result in various psychosomatic complaints. These arise chiefly from inadequate and faulty information and superstitions about the anatomy and physiology of the sexual apparatus. Sex education and supportive psychotherapy is all that is necessary for these patients. Very seldom, tranquillisers are also used to give symptomatic relief.

Sudden change in sexual appetite is more important medically since it can be a symptom of an illness—organic like endocrine diseases, brain tumour or functional like depression, schizophrenia and mania.

**Transient sexual symptoms:**

*Impotence* or inability to obtain an erection is in a majority of the patients psychogenic, very rarely organic e g. lesion of the spinal cord. It may be with certain partner or on certain occasions only and is related to the emotional relationship with the person concerned. It may be a symptom of other mental illnesses like homosexuality, depression, and schizophrenia Cases of pure impotence are helped by reassurance and placebo therapy More persistent cases need psychotherapy, abreactive therapy, or behaviour therapy.

*Premature ejaculation*—is a form of impotence and at times disturbs marital harmony. Besides reassurance and psychotherapy, tranquillisers may have to be given if the patient is very tense and anxious. Behaviour therapy is also useful.

*Frigidity* or lack of sexual feelings in women is similar to impotence in men It may be due to (1) anxiety over becoming pregnant (2) Marital disharmony (3) Faulty upbringing. (4) Homosexuality. Treatment consists of reassurance and psychotherapy.

**Sexual perversions:** No precise definition available. Persistent sexual gratification through non-heterosexual intercourse may be called perversions This may be due to (a) abnormality in the object of sexual gratification or (b) abnormality in the

*Differentiation from rheumatoid arthritis*—(a) Stiffness in the morning favours diagnosis of RA. (b) Arthritis of one joint in rheumatic fever does not last more than a few days even if no treatment is given. (c) Involvement of neck and proximal interphalangeal joint favours RA. (d) Normal E.C.G., negative ASO titre or absence of CRP excludes rheumatic fever.

(3) **Degenerative arthritis** (Osteoarthritis) :

*Classification*: (a) Primary—often hereditary and especially associated with Heberden's nodes. (b) Secondary—Secondary to traumatic, inflammatory or metabolic arthritis.

*Clinical features*—(a) Age—Usually after 50. (b) Joints involved—Principally weight bearing joints including apophysial joints of spine; terminal interphalangeal joints of fingers, metatarsophalangeal joint of big toe, first carpometacarpal joints, temporomandibular and sternoclavicular joints. Usually one or few joints affected which are stiff, painful and occasionally swollen. Limitation of movement with fine or coarse crepitus on motion, and wasting of muscles acting on involved large joints. Heberden's and Bouchard's nodes. Involvement of the trapeziometacarpal joint leads to the typical square appearance of the hand.

*Radiology*—Narrowed joint space, osteophytes (lipping), para-articular sclerosis.

*Laboratory investigations*—None diagnostic. Normal ESR.

*Management*—(a) Rest periods to take weight off involved joints. (b) Physiotherapy—in form of shortwave diathermy or inductothermy, exercises, wax treatment (for hands and feet), intermittent traction (for neck and lumbar spine), hydrotherapy (for large weight bearing joints especially hips). (c) Analgesics —in regular small doses. (d) Correction of predisposing factors —Reduction of weight in obese, correction of postural defects. (e) Joint aspiration and steroid injection—for acute synovitis, ligamentous pain and soft tissue lesions associated with spinal osteoarthritis. (f) Splints—to restrict movement during episodes of acute activity, to relieve weight bearing stresses and to correct deformity. (g) Surgical treatment—if intractable pain or marked joint instability. Arthrodesis, arthroplasty, osteotomy or removal of loose bodies.

(4) **Infective arthritis :**

(a) *Acute septic arthritis*—Hematogenous from focal sepsis, local introduction of sepsis e.g. wound or following aspiration of joint, or spontaneous sepsis in joint affected by

## Drug Addiction (Dependence)

**Definition**—Addiction refers to an illness characterised by—

1. Consumption of drugs to obtain a sense of well being or euphoria, even though there is no indication on medical grounds.
2. Increased requirement of the drug to get the "kick" because of the development of tolerance to the drug.
3. Physical and psychological dependence on the drug (craving) to obtain relief from mental anguish.
4. Physiological and psychological withdrawal symptoms when the patient abstains from the drug.

Deterioration of the patient's physical and mental health and the consequent adverse effects on the family and society are additional features of this illness.

**Etiology:** (1) Addiction is sometimes a symptom of mental illnesses like anxiety neurosis, schizophrenia and depression. (2) It is associated with other personality disorders like psychopathy. (3) It may be iatrogenic i.e doctor-induced phenomena in predisposed neurotic persons (4) Significant psychological trauma during infancy and childhood, disturbed parent child relationship, and parental disharmony, are more common in the life histories.

**Clinical manifestations:** The drugs to which addiction is frequently observed are: 1. Morphine and opiates 2. Cocaine. 3. Chloral hydrate 4 Cannabis indica (hashish, bhang, marihuna, etc.). 5. Barbiturate. 6. Amphetamine. 7. LSD-25 and other hallucinogenic drugs.

These drugs produce euphoria, in addition to the peripheral pharmacological effects, characteristic of each drug. They also produce symptoms of acute brain syndrome (toxic confusional psychosis), or chronic brain syndrome. Deterioration of moral and ethical sense, indulgence in antisocial and criminal activities, and nonspecific personality changes are additional features. Abstinence results in physiological and psychological withdrawal symptoms which are typical of each drug.

**Management:** Very difficult and disappointing. Withdrawal of the drug, slowly or abruptly, is most important. Hospitalisation with round the clock vigilance is necessary. Physiological withdrawal symptoms have to be treated symptomatically Psychological withdrawal symptoms are treated by giving adequate doses of tranquillisers or neuroleptics. Psychotherapy and casework are recommended to correct the basic psychopatho-

(f) *Viral infection of joints*—may occur in rubella, mumps, small pox, infective hepatitis, infectious mononucleosis Usually polyarthritis.

(5) **Arthritis due to metabolic and endocrine disorders:**

(a) **Gout—**

ETIOLOGY—Gout is caused by monosodium urate monohydrate or uric acid crystal deposition from hyperuricaemic body fluids. *Predisposing factors*—Age—Commonest in middle age. Sex—Males and postmenopausal females. Hereditary tendency. Conditions causing hyperuricemia. *Provocating factors*—Surgery, trauma, alcohol, rapid weight loss, unusual physical exercise, severe systemic illness, dietary excess, drugs—diuretics, initiation of uricosuric or allopurinol therapy. $B_{12}$ therapy in pernicious anemia.

*Clinical features*—(1) *Acute gouty arthritis*—Metatarso phalangeal joint of big toe commonly affected initially. Later foot, ankles, knees, hands, wrists or elbows may be affected Excruciating pain often worse at night. Joint returns to normal after few days with desquamation of overlying skin Sometimes associated anorexia, fever and general malaise. (2) *Chronic tophaceous gout*—As the disease becomes chronic pain and stiffness persist with irregular swelling Tophi in cartilage of ear, nose or eyelids in half the cases. Palms of hands may show white streaks along the creases (palsterer's hand) (3) *Associated conditions*—(a) Urolitiasis. (b) Renal disease—(i) Chronic urate nephropathy is rare. (ii) Acute urate nephropathy caused by precipitation of uric acid in collecting tubules. (c) Others—Gout and hyperuricemia are often associated with obesity, type IV hyperlipoprotenaemia, impaired glucose tolerance, hypertension and ischaemic heart disease.

*Radiology*—In late cases small punched out erosions (due to urate deposits).

CAUSES OF HYPERURICAEMIA—

(Normal uric acid 7 mg /100 ml. in adult males, 6 mg./100 ml. in females).

I *Decreased renal excretion of uric acid*—1. Reduction in renal functional mass—Chronic renal disease. 2. Reduction in glomerular filtration rate—Volume depletion, nephrogenic diabetes insipidus. 3. Reduction in fractional urate clearance —Hypertension, hyperparathyroidism, myxodema, Down's syndrome, increased levels of organic acids e g. exercise, starvation, alcohol, ketoacidosis. 4 Drugs—Diuretics, salicylates (low dose), pyrazinamide, ethambutol, angiotensin.

3. *Delirium tremens*—Syndrome observed in chronic alcoholic following excessive consumption, abstinence, or accident, fever or operation; metabolic changes are probably the cause. Physical symptoms include sleeplessness, restlessness, loss of appetite, refusal to eat food, weakness, tremors, disordered articulation and in severe degrees, signs of peripheral shock. Mental symptoms include dread and apprehension, visual and auditory hallucinations of a terrifying nature, disorientation of time and space sense, inability to recognise objects or carry out simple commands, amnesia for recent events, distractibility, suicidal and homicidal tendencies 25% of the patients may die of cardiac or renal complications. Rest recover either without any impairment of mental functions or progress into Korsakoff's psychosis.

   **Management**—consists of general measures to give symptomatic relief, nourishment, high doses of vitamin B complex, and neuroleptics Hydrocortisone in serious cases. Tranquillisers e.g. chlordiazepoxide and diazepam. Dependence on alcohol is treated by antabuse tablets 250 to 500 mg /day and psychotherapy (individual and/or group) as well as social case work.

4. *Alcoholic paranoia*—Paranoid states occurring in chronic alcoholic. Patients have reduced potency and develop delusions of infidelity on the part of the spouse.

5. *Alcoholic hallucinosis*—Develops insidiously or following an attack of delirium tremens. Auditory hallucinations of persecutory type, and ideas of reference are characteristic symptoms. Capacity for social adjustment is retained.

6. *Dementia*—Develops slowly or follows any of the previous syndromes. Tremors, indistinct speech, amnesia and mild euphoria are present Other features of chronic brain disorder may be present.

7. *Wernicke's syndrome*—Alcoholics with a restricted diet for a long time are more susceptible. Deficiency of vitamins, chiefly thiamine is considered the main cause. Symptoms include ataxia, fluctuating states of consciousness, delirium, ophthalmoplegia and diplopia. May result in Korsakoff's syndrome.

8. *Korsakoff's syndrome*—More common in women than in men. Develops gradually in chronic alcoholic or is a sequel to delirium tremens. (Other causes—wasting diseases, metallic and carbon monoxide poisoning and head injury). Physical signs include peripheral neuropathy with tender

(6) **Traumatic arthritis**—Acute monoarticular swelling occurring after injury. Marked pain with limitation of movement. Muscle wasting.

(7) **Neuropathic arthritis** (Charcot's joint)—may occur in tabes dorsalis, diabetes mellitus, syringomyelia, polyneuritis including leprosy and peripheral nerve injuries, congenital indifference to pain, hereditary sensory neuropathy, and congenital and acquired spinal cord lesions. Usually painless, bizarre deformation of joint with subluxation and hypermobility.

(8) **Arthritis with blood disorders:**

(a) *Hemophilic arthritis*—Acute arthritis due to sudden large hemorrhagic effusion following minor trauma, or chronic arthritis as a result of successive acute hemarthroses.

(b) *Arthritis with leukemia*—Acute monoarticular arthritis mimicking acute rheumatic fever may occur, particularly in acute monocytic leukemia.

(9) **Allergic (hypersensitivity) arthritis:**

(a) *Serum sickness*—is accompanied by arthralgias and arthritis in high percentage of cases but articular effusion uncommon. History of administration of serum or penicillin. Urticarial rashes.

(b) *Drug reactions*—Drugs which may produce arthralgia or transitory arthritis are epanutin, hydralazine, penicillin, sulphonamides.

(c) *Henoch-Schonlein purpura*—Arthralgia or arthritis which subsides without residue. Accompanying symptoms of crops of patechiae and abdominal pain with melena.

(10) **Connective tissue diseases:**

(a) *Systemic lupus erythematosus.*

(b) *Polyarteritis nodosa.* (See Collagen diseases).

(11) **Miscellaneous:**

(a) *Ulcerative colitis*—Arthritis with ulcerative colitis differs from rheumatoid arthritis chiefly in absence of subcutaneous nodules and absence of positive test for rheumatoid factor. Tendency to transient attacks, non-deforming.

physiological, psychological or social development i.e. delay in the milestones. (5) Defect in articulation of speech and vocabulary. (6) Poor scholastic performance like repeated failures in examinations. (7) Short span of general informations and practical knowledge. (8) Antisocial behaviour is more common in mentally defectives. (9) Inefficiency in work and poor economic achievements.

(B) *Psychological tests of Intelligence*—Various types of psychological tests are recommended to assess intelligence. These tests are standardised and their validity and reliability indices fall within the accepted range. Therefore, these tests give a satisfactory and scientific evaluation of the person's intelligence. The patient's co-operation is very necessary to carry out the tests. The tests include verbal and non-verbal or performance tests. These tests indicate the mental age of the patient and from that Intelligence Quotient is determined ($\frac{\text{Mental age}}{\text{Chronological age}} \times 100$).
Average I.Q. is 90 to 110. I.Q. of 70-90 is borderline intelligence or dull. I.Q. of less than 70 is mental deficiency. For correct assessment of a person's intelligence results from at least two tests, one verbal and one non-verbal, should be obtained.

GRADES OF MENTAL DEFECT—1. Mild or Moron. 2. Moderate or Imbecile 3. Severe or Idiot.

| *Grade* | *I.Q.* | *Mental age* | *Educable* | *Trainable* |
|---|---|---|---|---|
| Mild ... | 50 to 70 | More than 8 years | Yes | Yes |
| Moderate ... | 30 to 50 | 3 to 8 years | No | Yes |
| Severe .. | Less than 30 | Less than 3 years | No (require custodial care) | No |

**Etiology:** Several factors are incriminated, but in majority, no cause known (Idiopathic or Primary). These factors can be acting before birth, during birth or after birth but before complete mental development. Among the well recognised etiological factors are—1. Infection—virus infections like cytomegalic inclusion body disease and congenital rubella, congenital syphilis, toxoplasmosis and meningococcal meningitis. 2. Intoxication—bilirubin encephalopathy (Kernicterus), carbon monoxide and lead encephalopathy, postserum and postvaccinal encephalopathy, drugs like thalidomide. 3 Trauma or physical agents—Birth trauma, asphyxia at birth due to interference with

affected tissues, e g. virus of herpetic stomatitis by demonstration of intranuclear bodies from lesions of gums or buccal mucosa, virus of inclusion blenorrhoea, cytoplasmic inclusion bodies in viruses of vaccinia or variola, inclusion bodies (Negri bodies) in brain smears or immunofluorescence of skin biopsy or viral from saliva and other secretions. In rabies, cytoplasmic inclusions of trachoma.

2. *Culture*—In poliomyelitis, the virus can be grown from pharyngeal swab or throat washings in first week, and from the faeces for several weeks. Inoculation intranasally into a ferret or hamster of throat washing suspected of containing influenza virus, and intracerebral injection of spinal fluid from a case of lymphocytic choriomeningitis will produce symptoms characteristic of the infection after a time interval. In the chick embryo, virus multiplication may manifest itself by the death of the embryo or by development of plaques on the chorioallantoic membrane, e g. virus of herpes simplex and vaccinia. If the experimental host remains asymptomatic and no gross pathologic changes are noted, the presence of virus may be established by microscopic examination of tissues for typical pathological changes and inclusion bodies, or hemagglutination of red cells by chick embryo fluids in case of influenza and mumps.

3. *Serology—Demonstration of viral antibodies—*
   (a) Complement fixation test—influenza, typhus, atypical pneumonia, mumps.
   (b) Neutralization test—based on (i) ability of the agent to cause illness in an experimental animal, and (ii) ability of specific antibodies to protect the animal from the effect of these agents, e g. in equine encephalomyelitis.
   (c) Hemagglutination-inhibition test—viruses of influenza, mumps and measles agglutinate red blood cells. A specific antibody will inhibit the hemagglutination by these, but not by others.
   (d) Agglutination test—used for larger viruses like psittacosis, lymphogranuloma, and rickettsiae.
   (e) Non-specific antibodies or cold agglutination test—in primary atypical pneumonia, about 50-75% of patients may develop one or two types of antibody—(i) cold agglutination which agglutinates human group O erythrocytes at 40-45°F, (ii) an antibody which aggluti-

(b) Non-antisocial—(i) Habit disorders like thumb sucking, nail biting, bed wetting (enuresis), masturbation, food fads, picca, overeating, stammering. (ii) Personality disorders like shyness, daydreaming, aggressiveness, temper tantrums, sensitiveness, obstinacy, restlessness. (iii) Scholastic problems like refusal to go to school, truancy from school, scholastic backwardness. (iv) Psychosomatic complaints like anorexia, vomiting, constipation, diarrhoea.

These behaviour problems are usually observed in clusters and seldom as an individual symptom.

The causes and management of psychosis, neurosis, epilepsy and mental subnormality is similar to that discussed already. Psychosomatic illnesses and behaviour problems need special mention.

**Causes of behaviour problems:** Not clearly established but important factors are:

1 Heredity and constitution.
2. Physical defects and physical illnesses.
3 Intelligence—low as well as high.
4. Unhealthy parent child relationship and abnormal parental attitudes like overprotection, rejection, favouritism, comparison, negligence, leniency, strictness, inconsistency, etc. *Common causes* of these adverse attitudes are:
   (a) Ignorance on the part of parents about the psychological needs of the child like love, security, play, discipline, recognition, etc.
   (b) Illness of the parents—mental as well as physical.
   (c) Disharmony between parents.
   (d) Broken home due to death, divorce and desertion.
   (e) Separation from either or both parents because of their occupation.
5 Social and cultural factors e g. methods of upbringing, family living, etc.
6. Physical environment like overcrowding, slums, poor sanitation and hygiene, etc.
7. Institutionalization.

**Management:**

*Of children*—The ideal place for treatment of the psychiatric problems of children is a child guidance clinic, where a team consisting of psychiatrist, psychiatric social worker and clinical

4 *High density lipoprotein* (HDL) which transport cholesterol from peripheral cells.

Chylomicrons and VDLD are triglyceride rich LDL, while HDL are cholesterol-rich. The plasma lipid values permit accurate assessment of which lipoprotein is raised. Determination of plasma cholesterol and triglyceride concentration after a 12-24 hour overnight fast is usually sufficient for clinical purposes.

Types of hyperlipoproteinaemias:

| Type | Appearance of plasma | Total Cr. | LDL Cr. | Total Tr. | Lipoprotein electrophoresis |
|---|---|---|---|---|---|
| I | Cream layer on top, clear below | + | — | + | Chylomicron |
| IIa | Usually clear | + or N | + | N | β+ |
| IIb | Slightly turbid | + | + | + | Pre-β+, β+ |
| III | Usually turbid with faint cream layer | + | + or N | + | Broad β in plasma |
| IV | Usually turbid, no cream layer | + or N | N | + | Pre-β+ |
| V | Cream layer on top, turbid below | + | N or — | + | Chylomicron, Pre-β+ |

**Causes**: of hyperlipedemias.

Hypertriglyceridaemia. Normal—upto 200 mg./100 ml.

1. *Overproduction of triglyceride-rich lipoproteins*—(a) Primary—(i) Familial hypertriglyceridaemia. (ii) Familial combined hyperlipedaemia. (b) Secondary—Hyperinsulinaemic states—obesity, exogenous oestrogens, glucocorticoid excess. (ii) Alcohol.
2. *Impaired lipoprotein lipase mediated triglyceride removal*—(i) Primary lipoprotein lipase deficiency. (ii) Genetic absence of lipoprotein lipase activator. (b) Secondary—(i) Insulin deficiency. (ii) Hypothyroidism. (iii) Uraemia.

Hypercholesterolaemia (Normal—150-250 mg./100 ml.) (3.9-6 5 mmol /1).

(a) Physiological in pregnancy. (b) Metabolic disorders—hypothyroidism, severe diabetes mellitus, coeliac disease, xanthomatosis, obesity, atherosclerosis (c) Cushing's syndrome, oral contraceptives. (d) Nephrotic syndrome. (e) Chronic hepatitis, biliary cirrhosis (f) Alcohol ingestion.

MANAGEMENT—

1. Anti-epileptic drugs.
2. Symptomatic treatment with antipsychotic and anti-depressant drugs. E.C T. can be given if drugs fail to control symptoms
3. Psychotherapy and social case work.
4. Rehabilitation of the patient and education of family members.

## 10. PSYCHIATRIC PROBLEMS OF OLD AGE

CLINICAL FEATURES—Senescence (old age) begins after the age of 65 years This biological phase of life is characterised by gradual deterioration in physiological and mental functions. Depending upon the prevalent socio-cultural milleu, the attitude towards the advancing senescence is one of acceptance or rejection. The old man is thus welcome or otherwise by his family and his friends, as well as relatives These reactions play a significant role in influencing the mental health of the individual.

Senescence is also associated with personality changes. Physical illnesses are often coupled with mental changes. Psychotic illnesses both organic (dementia) and functional (paranoid reactions, depression) are also common. It has been observed that these psychological syndromes are less frequent and intense if the old person is not alienated from his family and social environment

MANAGEMENT—1. Symptomatic treatment with antidepressant, antipsychotic, antianxiety and sedative drugs. Piracetam 800-1600 mg t d s 2. Rehabilitation.

material (not self). Tissue damage which occurs during the response to foreign material is referred to as heteroimmune.

**Immunological mechanisms:**

1. MACROPHAGES—process antigens and present them in a form which either stimulates the lymphocytes or induces tolerance. At a later stage they act as phagocytic cells and are capable of engulfing particulate antigens and immune complexes. Much of its effectiveness depends on lymphocyte response.

2. LYMPHOCYTES— (a) *T cells* which have a high binding affinity for the antigen in question.

   (b) *B cells* which release specific antibody molecules. This immune response once activated, recruits cells wherever they are needed and stimulates the body's non-specific defence mechanisms of inflammation. At the same time it creates a reserve of 'memory cells' against future demands.

   (c) In addition to T and B cells, a third category of mononuclear cells are capable of lysing antibody-coated cells in absence of complement and are known as K cells (killer cells).

3 IMMUNOGLOBULINS—Of the four main classes of immunoglobulins, it is IgA which is chiefly involved in providing surface protection at the mucous membranes by contributing to the 'antiseptic paint' effect of the mucous secretions. Once the barrier of skin and mucous membrane is reached, other mechanisms operate. IgE (reaginic antibody) is concentrated in submucous tissues. It is the major antibody response for immediate allergic anaphylactic reactions.

**Immunologically-mediated disease:** The mechanisms of antibody-mediated and cell-mediated tissue damage which alone or in combination may produce clinical disease are—

1. *Reaginic tissue damage*—All normal individuals produce IgE antibodies but at normal levels of exposure to antigen the reaginic response does not lead to serious clinical disorder and is probably limited by the influence of suppressor T cells. When antigen reaches higher levels in the tissues reaginic reactions occur e.g. urticaria, asthma or acute anaphylaxis. *Atopy* describes the condition of patients with familial tendency to develop abnormal hypersensitivity to common antigens. Examples are extrinsic allergic asthma, allergic rhinitis and hay fever, vernal keratoco-

COMPLICATIONS: 1. Eczematization 2. Secondary infection. 3. Id eruption. 4 Urticaria. 5 Glomerulonephritis 6 Contact dermatitis to antiscabetic drugs.

VARIANTS OF SCABIES—(a) Scabies in clean individuals. (b) Scabies incognito—occurs in persons treated with steroids. (c) Nodular scabies (d) Animal scabies. (e) Scabies with syphilis. (f) Norwegian scabies—Severe variety in persons with low immunological status

DIFFERENTIAL DIAGNOSIS—Similar signs are found with papular rashes from fleas, including papular urticaria; eczema especially pompholyx reactions of the hands, also atopic eczema in young children with maximal lesions on extremities; generalised pruritus, lichen planus, onchocerciasis, delusions of parasitosis (parasitophobia), dermatitis herpetiformis, sarcoptic mange from pets.

**Management:**

1. All the family members should be treated at the same time.
2. The clothes, bed linen and towels should be boiled and ironed.
3. Secondary infection should be treated first.
4. Specific therapy—The patient must bathe and scrub the body with a brush to lay open the burrows. After the bath the skin is dried and the scabicide applied from neck to toes.
   (a) Sulfur ointment—10% for adults and 5% for children, 2.5% for infants is applied to the whole body on 4 consecutive nights or twice daily for 3 days.
   (b) Benzyl benzoate—used as a 25% solution from neck to toes and allowed to dry. The process is repeated on 3 consecutive days after a bath.
   (c) Mitigal (Mesulphen), dimethyl diphenyl disulphide—used as a 10% solution in liquid paraffin. It is applied for 3 consecutive nights.
   (d) Gamma benzene hydrochloride—1% used as a cream or lotion in the same manner as benzyl benzoate.
   (e) Monosulfiram (Tetmosol)—25% in an alcoholic base, diluted with 4 parts of water before use.
5. Control of pruritus—with antihistamine and an antipruritic ointment rubbed into the parts twice or thrice a day. The pruritus may persist for a while after destruction of the acari by the specific treatment.

7. *Nervous system*: Myasthenia gravis, demyelinating diseases such as multiple sclerosis, infectious polyneuritis.
8. *Skin diseases*:

| | |
|---|---|
| Eczema | Vitiligo |
| Psoriasis | Chronic annular erythemas |
| Alopecia areata | Pyoderma gangrenosum |

9 *Eyes*: Phacogenic uveitis following injury to lens and after cataract operation. Sympathetic ophthalmia occasionally after penetrating eye injury.
10. *Goodpasteur's syndrome*: Autoimmune hemolytic anemia, leucopenia and thrombocytopenic purpura, glomerulonephritis, and hemoptysis.

**Laboratory diagnosis**: of immune disorders—

1. PROTEINS—(a) *Electrophoresis*—for initial analysis of proteins in serum, urine or CSF. Quantitative assessment of total immunoglobulins and qualitative evaluation for increase in monoclonal or polyclonal immunoglobulins. (b) *Additional techniques*—for determining specific functional characteristics of serum proteins—(i) Serology for microbial disease. (ii) Complement—Some can be assayed quantitatively by radial immunodiffusion or nephelometry, others using component deficient reagents comparable to investigation of coagulation defects. (c) Auto-antibodies—(i) Indirect immunofluorescence with patient's serum antibody binding to tissue sections. Others are specific receptor binding assays or thyroid stimulating hormone receptor and other assays e.g. precipitation, RLA complement fixation, hemagglutination. Tissues or organs may be examined by immunofluorescence to demonstrate deposits of immune complexes for example basement membrane antibody in Goodpasteur's syndrome. (d) Reagininic or IgE antibodies specific for common antigens such as dust, mites, pollens and moulds radioallergosorbent (RAST) tests. (e) Circulating immune complexes—e g. assay of complexes binding to other proteins as in rheumatoid factor.
2. LYMPHOCYTES—(a) *Numbers*—(i) T cells by their ability to bind sheep erythrocytes (E) forming a rosette. (ii) B cells by presence of surface membrane immunologlobulin demonstrable by immunofluorescence and also formation of rosettes with C3 antibody-coated sheep or erythrocytes (EAC) binding to the C3 receptor. (iii) Non-T, non-B cells by use of IgG antibody-coated sheep erythrocytes (EA). (b) *Function*—of lymphocytes by delayed hypersensitivity skin

**Classification:**

1. *Superficial mycoses*: Tinea versicolor, Tinea nigra, Trichomycosis axillaris, Pierda, Candidiasis.
2. *Cutaneous mycosis*: Ringworm fungi.
3. *Subcutaneous mycosis*: Mycetoma, Rhinosporidiosis, Sporotrichosis, Chromoblastomycosis.
4. *Systemic mycosis*: Actinomycosis, Nocardiosis, Candidiasis, Histoplasmosis, Blastomycosis, Coccidioidomycosis.
5. *Miscellaneous*—Aspergillosis, mucomycosis.

## Ringworm (Dermatophytosis)

**Etiology:** This superficial fungus infection is caused by species of three genera of fungi—Trichophyton, Microsporum and Epidermophyton The clinical picture produced by them is often similar, and identification is difficult to ascertain without culture, hence these dermatophytes are best described according to the region of the body involved. Dermatophyte fungi are found in the soil, in animals and human beings. They live on the superficial layers of the epidermis, hair and nails. The factors that promote dermatophytosis are a warm humid climate, poor nutrition and hygiene, contact with infected animals and humans. debilitating diseases

**Clinical Types:**

**Tinea capitis**—Scalp ringworm is commonest in children and is sometimes seen in epidemic proportions amongst them The infections are caused by species belonging to either Microsporun or Trichophyton It is usually spread by caps, barber's instruments, hair brushes and combs. There is a patchy hair loss, with broken hair The hair fluoresce under Wood's light. The fungus gets a foothold in the stratum corneum and grows in it, later it enters the hair follicle, penetrates the hair cortex and flourishes inside The weakened hair then breaks giving rise to a bald patch Types: (1) Black dot patch (2) Grey patch with scaling (3) Inflammatory type. Certain fungi cause deep, boggy swelling called a kerion (4) Favus—Circular yellow cups made up of a fungal mat (scutula) surround the hair follicle. It occurs also on the nails and body Patients have a "mousy" odour. Tinea capitis should be differentiated from impetigo, alopecia areata, seborrhoeic dermatitis.

**Tinea barbae**—This beard ringworm is usually found in adult males It is acquired from a barber's instruments, or from animals The lesions are similar to tinea infections elsewhere Types: (1) Non-inflammatory type—spreading peripherally and

presents a distinct clinical pattern, but they are in general characterised by constitutional manifestations as well as local lesions in joints, blood vessels, heart, skin, muscle and the supporting reticulum of internal organs.

**Systemic lupus erythematosus**

Most common of the collagen diseases. Usually in young females. *Clinical features*—

1. *Skin*—(a) Butterfly rash on face. A peculiar dusky lilac suffusion may appear on upper eyelids (heliotrope rash). (b) Vasculitic rashes—on elbows, knees, hands and feet—punctate erythematous rash, palmar erythema, periungual erythema or livido reticularis. (c) Alopecia—diffuse or patchy. (d) Discoid lupus erythematosus.
2. *Joints*—Symmetrical arthralgia or arthritis.
3. *Lungs*—(a) Pleural chest pain. (b) Pleural effusion and radiological evidence of lung disease rare (c) Shrinking lung syndrome involving progressive diaphragmatic elevation.
4. *CNS*—(a) Neurological features—Seizures, hemiparesis, cranial nerve palsies, meningitis, chorea and peripheral neuropathy. (b) Psychic features—range from personality changes and depression to psychosis. (d) CSF—Elevated protein and lymphocyte count may occur.
5. *Kidney*—Diffuse proliferative glomerulonephritis, nephrotic syndrome.
6. *Blood*—Normocytic normochromic anemia common, hemolytic anemia and thrombocytopenia.
7. *Pregnancy*—Tendency to develop deep vein thrombosis. Spontaneous abortion common. Disease activity may increase post-partum.

*Diagnosis*—(a) LE cell factor. (b) ANA useful for screening. (c) DNA antibodies—Antibodies to double stranded DNA most specific. (d) Complement—Hypocomlementaemia indicates disease activity. (e) CRP levels rise with infection. (f) Lupus band test—Immunofluorescence at dermo-epidermal junction of uninvolved skin fairly specific for SLE.

*Treatment*—1. Aspirin—for fever and myalgia 2. Corticosteroids—1 mg./kg. body weight of Prednisolone for 6 weeks, followed by slow tapering over 6 months. 3 Chloroquine—6 mg./kg./day useful for controlling skin and joint manifestations 4. Immunosuppressive drugs—if tapering of initial prednisolone course cannot be continued because of increasing disease activity,

SPECIFIC TREATMENT—

(a) *Local treatment*—

1. *Wet compresses*—Vesicles, blisters, and pustules should be broken down and treated with wet compresses of 1:4000 solution of potassium permanganate, or Burrow's solution (solution of Aluminium acetate) diluted 1 in 15.
2. *Tolnaftate*—solution can be applied to superficial lesions.
3. *Keratolytic agents*—are best used on hyperkeratotic lesions which require softening and exfoliation. Half strength Whitfield ointment may be applied twice a day.
4. *Imidazole derivatives*—(Clotrimazole, miconazole or econazole) may also be applied twice a day.
5. *Surgical avulsion*—of infected nails together with systemic griseofulvin therapy, is the best therapy for infection of the nails.

(b) *Oral therapy*—Griseofulvin is no substitute for local therapy, which must be used side by side Dosage of 500 mg daily; it should not be stopped until there is a negative scraping and culture, and the lesions have completely disappeared. For Tinea capitis 1 gm. per day for 3 to 5 weeks, for children 0 5 gm. per day for the same period may be given. Griseofulvin may have to be given for as much as 5-6 months for finger nails and as much as 18 months for toe nails. Common side effects of grisofulvin are headache, gastrointestinal irritation, skin rashes and photosensitivity. It should not be administered with anti-coagulants or barbiturates.

## Tenia versicolor

**Etiology:** It is the most superficial fungus infection produced by Malassezia furfur, characterized by scaly white or brown patches, asymptomatic in nature

**Clinical features:** Macules and patches of various sizes and shapes, yellow, white or brown in colour occur at any site in the body commonly on the trunk The lesions are scaly and easily detected when the part is abraded with a pin. It is seen in people who sweat excessively The patches fluoresce under Wood's light

**Management:** The underclothes must be boiled daily and the body must be kept dry as far as possible. Any of the following may be used locally—

1 *Sodium hyposulphite*—in a 20 per cent solution, applied daily after a bath is very effective.

3. *Inflammatory myositis associated with malignancy*—occurs equally in both sexes, with or without associated skin rash.
4. *Childhood myositis*—Occurs as acute intermittent or chronic disease. Skin rash may be present. Calcification of muscles, skin and subcutaneous tissues may appear after some years
5. *Myositis associated with overlap syndromes*—such as systemic sclerosis, or SLE, or rheumatoid arthritis.

*Diagnosis*—(a) Muscle enzymes—usually elevated especially creatinine phosphokinase. (b) Needle biopsy of affected muscle—Degeneration or necrosis of muscle fibres with inflammatory cell infiltrate. (c) EMG—shows fibrillation, polyphasic action potentials and in some bizarre, high frequency repetetive discharges

*Treatment*—Prednisolone 40-50 mg /day. Azathioprine 2 5 mg / kg /day should be added if response is slow. Physiotherapy.

**Scleroderma :**

Majority between 30-50 years. Women affected twice as frequently as men. *Clinical manifestations* consist of one or more of following—(a) Cutaneous—Reynaud's phenomenon and puffiness of fingers initially. As scleroderma progresses joint mobility is lost, mouth size diminishes, skin creases disappear and skin over nose and below the eyes loses its elasticity. (b) Musculoskeletal—Chronic mild myopathy. Tendon sheath fibrosis can produce 'creaking' noise on flexing the fingers. (c) GI — Oesophageal hypomotility and dysphagia. Reflux oesophagitis may lead to stricture. Malabsorption from small intestinal hypomotility and bacterial overgrowth. (d) Lungs—Reduction in diffusing capacity. Pulmonary hypertension may occur. (e) Heart—Pericardial effusion or rarely restrictive cardiomyopathy. (f) Kidney—involvement usually late, may lead to hypertension.

*Diagnosis*—(a) Skin biopsy—In prefibrotic phase interstitial oedema and perivascular cuffing, later extensive fibrosis. (b) ANA in 40-60%. *Treatment*—None specific Propranolol for hypertension. Skin care, physiotherapy, prompt treatment of the infection.

**Mixed connective tissue disease** (*MCTD*)—Composite of SLE, scleroderma and polymyositis. Significant findings are—Raynaud's phenomenon, sausage-shaped fingers and scleroderma-like skin, arthritis, myositis. High titre of ANA and antibodies to ribonucleoprotein (RNP).

(b) *Local*—(i) Wet work must be stopped in cases of paronychia. Nystatin cream is applied to the nail fold. Amphotericin B lotion or cream may also be used. (ii) Intertriginous regions must be kept dry. Obese patients must reduce their weight. Nystatin powder should be used on the affected areas. If the parts are inflamed repeated soaks are to be used, dry thoroughly, and then use Nystatin cream or Amphotericin cream or lotion. Gentian violet 0 25% or Castellanis paint is also effective but will stain the clothes (iii) Vulvovaginitis can be treated with Nystatin suppositories inserted twice daily for 7-14 days and then once at night for 2-3 weeks.

## 4. PYODERMAS

**Definition:** These are skin infections produced by pus forming organisms, mostly gram positive group A beta haemolytic streptococci, and Staphylococcus aureus. A variety of clinical pictures are produced depending on the site of infection.

**Clinical manifestations:**

1. **Impetigo contagiosa**—It is the most superficial of all the pyodermas. It can occur as such, or secondary to scabies, pediculosis, insect bites, herpes, and eczemas. Common in children, it begins as an erythematous spot, rapidly forms a vesicle with clear fluid, which becomes purulent and dries forming a thick yellow crust Removal of this crust exposes underlying eroded surface with a little oozing, this fluid is contagious to the surrounding areas or infects the hair follicles giving rise to a folliculitis. There are no symptoms. The crusts fall off and leave no scar. The lesions are usually multiple, and unless severe have no constitutional symptoms

2. **Ecthyma**—This is a deeper infection, usually seen in debilitated individuals The lesions start as vesicles which dry up to form thick crusts, removal of which displays an underlying lake of pus in a saucer shaped ulcer. It is found mostly on the legs, and heals with scarring

3. **Folliculitis**—It is a pyoderma of the hair follicle. There are two types—(a) *Superficial folliculitis* (Bockhart's impetigo) —is a folliculitis of the superficial part of the hair follicles and perifollicular region giving rise to follicular pustules covered by crusts. Infection spreads from one follicle to another.

(b) *Deep folliculitis—Sycosis barbae* is a folliculitis of the beard area of the face. There is no pain but itching and burning are the only symptoms, there is no oozing or weeping at any stage.

2. *Cutaneous hepatic porphyria*—Bullous dermatosis on parts exposed to sunlight. Often troublesome pruritus. Evidence of hepatic disease clinical and biochemical. May be precipitated by alcohol and drugs such as barbiturates, chloroquine, chlorpropamide, tolbutamide.
3. *Porphyria variegata*—Combination of clinical features of acute intermittent and cutaneous hepatic porphyria.
4. *Hereditary corpoporphyria*—Both systemic and cutaneous signs Abdominal pain, vomiting and constipation are the usual presenting features.

II **Erythropoietic porphyrias**—

1. *Congenital porphyria*—Skin reaction to sunlight more severe than that of cutaneous hepatic porphyria Pruritus and erythema followed by vesicle and bulla formation. Teeth coloured brownish-pink. Anemia and splenomegaly common.
2. *Erythropoietic protoporphyria*—Pruritic urticarial swelling and redness of skin on exposure to sunlight. Hepatic disease may be important feature in some.

DIAGNOSIS—(i) Abnormal porphyrin content in blood, urine and stool. The type of porphyrin can be identified from the clinical picture together with the pattern of porphyrins. (ii) Increased activity of the precursor substance deltaaminolaevulic acid (ALA) synthetase in liver, bone marrow or both.

MANANGEMENT—No specific therapy except venesection in cutaneous hepatic porphyria. Management involves prophylaxis such as avoidance of drugs like barbiturates and alcohol in patient with acute hepatic porphyria. Symptomatic treatment of acute attacks with analgesics, sedatives and correction of fluid imbalance. Alleviation of cutaneous symptoms by protection from sunlight. Beta-carotene 90 mg. daily in erythropoietic protoporphyria.

**Glycogen storage disease, Type 1**

*Cause*—Due to absence of glucose-6-phophatase activity in liver, renal cortex, GI mucosa and platelets.

*Clinical features*—Hypoglycemia early in life. Hepatomegaly. Bleeding due to glycogen accumulation in platelets. Gouty arthritis. Others—Hyperlipidaemia, lactic acidosis, growth retardation and delay in pubertal maturation.

*Diagnosis*—Liver biopsy with assay of hepatic glucose-6-phosphatase activity.

(a) *Local treatment*—Wash the part well with soap and water, and remove the crusts. Apply an antiseptic lotion around the area consisting of 0.5 per cent cetrimide solution, or boric acid solution, or Condys solution Furuncles may be fomented with boric acid solution, and if pointing should be incised, so also the blisters of impetigo. Apply Bacitracin, Neomycin or Gentamycin or Fucidin locally two or three times a day.

(b) *Systemic antibiotics*—are used in extrinsic and deep infections, especially if the pyoderma is chronic or situated on the upper lip, nose or cheek. Onacillin, (0.5-1 g. every 6 hours) or Lincomycin (0.5 g four times a day) or Erythromycin (0.25 to 0 5 g. four times a day). Penicillin is treatment of choice for pyodermas

## 5. ECZEMA

**Definition:** Eczema is a non-contagious inflammatory disease of the skin in response to endogenous or exogenous stimuli characterised by erythema, oedema, vesiculation, oozing, weeping and crusting. Microscopically there is an intraepidermal vesiculation It is due to an antigen antibody reaction where the shock tissue is the epidermis.

**Pathophysiology:** Eczemas begin with erythema and oedema followed by the appearance of minute vesicles and papules in the area. The vesicles rupture, and this gives rise to an oozing of fluid, alternatively it may dry up with scaling and crusting. After healing up of the eruption, there is a residual pigmentation left However, sometimes it does become chronic in which the skin becomes lichenified, where the skin is thickened with exaggerated skin markings and hyperpigmentation. *Types*—Eczemas may thus be described as acute, subacute or chronic depending on the type of lesions seen. In the acute stage there is redness, swelling, vesiculation, oozing, scaling and crusting In the chronic stage there is lichenification. The subacute stage has features of both acute and chronic eczema.

**Types of eczema:**

1. **Contact dermatitis**—It is due to skin contact with an agent in the environment It may be a true allergic contact dermatitis involving an allergen and a sensitized individual, or a primary irritant capable of producing an eczema on any skin.

*Common contactants are*—

(a) *Cosmetics*—lipsticks, creams, powders, hair dyes, deodorants, perfumes (b) *Plastics*—as in footwears, hand bags (c)

**Phenylketonuria (PKU)**

*Cause*—Deficiency of enzyme phenylalanine hydroxylase which catalyzes conversion of phenylalanine to tyrosine.

*Clinical features*—usually appear after first year of life. Mental and growth retardation, eczema and pigment dilution, seizures, tremor, muscular hypertonicity, microcephaly, enamel hypoplasia and decalcification of long bones.

*Diagnosis*—Serum phenylalanine raised (>1.2 mmol/litre) with raised urinary phenylacteic acid and phenylpyruvic acid.

*Treatment*—Dietary restriction of phenylalanine to maintain blood level at 2 5-7.5 mg./100 ml. (0.15-0.45 mmol/litre).

## 16. SEXUALLY TRANSMITTED DISEASES

1. **Venereal diseases**—Syphilis, gonorrhoea, lymphogranuloma venereum (See Chapter 12).

2. **Nonspecific genital infection**—

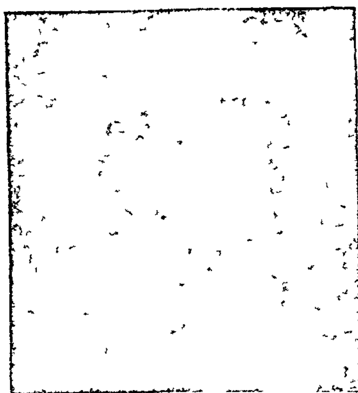
   NONSPECIFIC URETHRITIS (NSU)—Infective agent probably Chlamydia trachomatis, or trachoma inclusion conjunctivitis (TRIC) agent.

   *In men*—(1) Urethral discharge usually mucoid, sometimes mucopurulent (ii) Dysuria. Complications—Proastatitis, epididymitis, rarely Reiter's syndrome. Treatment—Oxytetracycline 250 mg. q.d.s. for 2-3 weeks. If no improvement Erythromycin stearate 250 mg. q.d.s. for further 3 weeks. Follow up for relapse for 3 months.

   *In women*—Diagnostic criteria—Male partner with NSU, presence of leucocytes in urethra, inflammatory changes in cervix, positive Chlamydia culture from cervical secretion. Treatment—Female contact of a man with NSU should be treated with tetracycline. Erythromycin should be given to pregnant women.

3. **Viral sexually transmitted diseases**—

   (a) *Genital herpes*—caused by herpes virus hominis type II. Incubation period 4-5 days. Cluster of vesicles on genitals, these rupture leaving erosions which are painful. Malaise, and fever may occur Cervical herpes occasionally causes severe necrotic ulceration. Complications—Transmission to foetus during pregnancy, meningitis and herpes hepatitis. Treatment—5% IDU in dimethylsulphoxide locally. Sulphonamide orally for secondary infection.



Tinea corporis



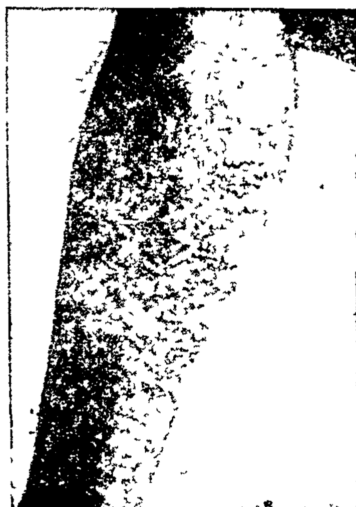
Lichen planus



Tinea versicolor



Psoriasis



Folliculitis



Secondary syphilis

3. Pancreatitis.
4. Malabsorption syndrome.

C. *Cardiac*—

1. Extrasystoles.
2 Congestive cardiomyopathy.
3. Beriberi heart disease.

D. *Metabolic*—

1. Hypoglycemia—(a) Alcohol-induced fasting hypoglycemia. (b) Alcohol potentiation of insulin-induced hypoglycemia. (c) Essential reactive hypoglycemia following a rich carbohydrate meal. (d) Alcohol-induced reactive hypoglycemia from consumption of modest amounts of alcohol with moderate amounts of readily assimilable carbohydrates.
2 Hyperglycemia—Long continued heavy drinking can occasionally precipitate symptomatic diabetes mellitus which remits on abstaining from alcohol.
3 Ketoacidosis and hyperuricemia.
4 Lactic acidosis.
5 Hyperlipoproteinemia.
6. Zieve's syndrome—Hyperlipemia, anemia and jaundice.

E. *Endocrine*—

1. Pseudo-Cushing's syndrome.
2 Isolated ACTH and HGH deficiency.
3. Hypogonadism

F *Electrolyte disorders*—Hypomagnesaemia, hyponatraemia, hypophosphataemia.

G. *General*—Lowered resistance to infection. Decreased hemopoiesis. Hypothermia.

**Amyloidosis:**

A. *Primary*—

1. Primary systemic amyloidosis.
2 Primary localised (tumor-forming) amyloidosis.
3. Generalised amyloidosis with renal failure.
4. Neuropathy with amyloidosis.
5. Amyloidosis cutis.
6. Cardiovascular amyloidosis.
7. Amyloidosis, urticaria and deafness.
8. Familial mediterranean fever.

6. **Stasis dermatitis**—Is found in patients with varicose veins. It usually starts with oedema around the ankles, trauma and scratching will result in the development of an eczema. It is usually localised to ankle in the region of the medial malleolus Secondary infection results in ulceration.

**Management:**

1. LOCAL:

(a) *Acute phase*—Wet compresses should be applied to the part several times during the day. It helps to drain the exudate and cools the part. The wet dressings may be of Burrow's solution (aluminium subacetate and glacial acetic acid diluted 1:20) or potassium permanganate 1:8000 solution. A lotion containing calamine, zinc oxide and glycerine 1 dr. each and aqua calcis upto 1 oz. is applied frequently during the day. If there is severe itching ½ gr. of menthol may be added. Calamine dries up the exudate and forms a protective layer.

(b) *Drying phase*—When the oozing has stopped, and the lesions are drier, zinc cream or calamine liniment is used. Local corticosteroid creams are also helpful. If local infection is present, a cream containing an antibiotic such as Neomycin may be used

(c) *Dry phase*—Ointments are occlusive and most useful. An ointment containing 2% crude coal tar or a steroid ointment is used.

2 SYSTEMIC:

(a) *Corticosteroids*—in extensive cases after ruling out the contraindications. Dosage depends on the severity of the case.

(b) *Antibiotics*—are used in the presence of bacterial infection, where there may be a purulent discharge, fever or lymphadenopathy.

(c) *Antihistaminics*—are used for their sedative effect to relieve the pruritus.

## 6. ACNE VULGARIS

**Definition:** It is a common inflammatory disease of the pilosebaceous follicles seen in adolescents, characterized by comedones which are secondarily infected, resulting in papules, pustules, cysts, nodules and scars.

**Theories of causation**—1. Increase in the quantity of androgens secreted, or increased sensitivity of the sebaceous glands to androgens 2 Alteration in composition of seabaceous secretion

3 *Labyrinthine ataxia*—Acute labyrinthitis, hemorrhage into internal ear, acute lesions of vestibular nucleus in medulla, attacks of vertigo of Meniere's disease.

**Backache:**

1. *Diseases of vertebral column*—Pott's disease, tumor, diseased intervertebral disc, sacroiliac arthritis, osteitis fibrocystica, osteitis deformans, osteomalacia, osteoporosis of various types. Congenital malformation e.g. sacralization of 5th lumbar vertebra. Spondylarthritis or spondylarthrosis, multiple myeloma, malignant deposits.
2. *Disease of spinal cord and meninges*—Trauma, infection, neoplasm.
3 *Soft tissue involvement*—Fibrositis (lumbago); acute traumatic injury causing contusion, hemorrhage, rupture of muscle fibres, fascia or ligaments. Acute infections such as influenza, exanthemas, dengue, brucellosis.
4. *Referred pain*—(a) Pancreas—tumor, cyst or sometimes even chronic pancreatitis. (b) Lymph nodes—lymphosarcoma, Hodgkin's disease, lymphatic leukemia or cancerous metastases. (c) Retroperitoneal hematoma. (d) Aneurysm of abdominal aorta. (e) Kidney disease—Calculi, tumors, tuberculosis, polycystic kidneys, hydro or pyonephrosis, pyelonephritis, perinephric abscess. (f) Disease of female genital organs (gynecologic backache). (g) Disease of prostate. (h) Cancer of rectum.
5. *Faulty body posture.*
6. *Depression.*

**Basilar impression:**

1. *Congenital*—Invagination upwards of base of skull may be associated with deformity of the foramen magnum, occipitalization of the atlas, compression of structures in the posterior cranial fossa (with signs of pyramidal tract and cerebellar dysfunction) and a rise of intracranial pressure from obstruction to cerebrospinal fluid flow.
2. *Klippel-Feil syndrome*—Fusion of bodies of some cervical vertebrae.
3. *Bony disease*—Osteomalacia, rickets, Paget's disease.

**Cafe-au-lait spots:** (5 or more with atleast one with long axis more than 1 cm. to be significant) 1. Neurofibromatosis (von Recklinghausen's disease). 2 Albright's disease (Polyostotic

a day for weeks or months after the lesions subside. The tetracyclines act on the acne bacillus, and also reduce the fatty acid in the gland.

(b) *Hormone therapy*—Cyclical hormone therapy with oestrogens for 4 to 5 cycles has helped some patients.

## 7. URTICARIA

**Definition:** A common condition characterized by wheals on the skin occurring on any site of the body. They are intensely pruritic, lasting less than 48 hours. When it occurs at the submucosa or deeper dermis and subcutaneous tissue it is termed angioedema It is produced by an increase in vascular permeability and extravasation of protein and fluids.

**Types of Urticaria:**

1. **Allergic urticarias**—

(a) *Acute urticaria*—lasts for a few hours or days. It is characterized by the presence of small circumscribed areas of oedema, pink in colour, with central pallor. The number varies, and it occurs anywhere on the body asymmetrically. It is seen in patients with anaphylaxis, atopy, serum sickness or as a reaction to insect bites, foods and drugs.

(b) *Chronic urticaria*—is so called when attacks are present for more than 6 weeks. It lasts for months or years. In most cases the cause is difficult to pinpoint but drugs, food, inhalants, parasitic infestation, infections, collagen diseases and malignancy should be ruled out.

2. **Non-immunologic urticarias**—

(a) *Cholinergic urticaria*—produced by acetylcholine, not histamine, and is triggered by change in temperature, heat, exercise, emotion Lesions are punctate or papular wheals, disappearing in 30-60 minutes (b) *Dermatographic lesions*—probably produced by kinins, slow reacting substance, or other vasodilator substances, are induced by trauma or pressure A slight scratch of low intensity produces a marked response.

**Causes:**

1. *Infections*—with bacteria, fungi, viruses, protozoa, intestinal parasites.
2. *Ingestants*—Foods such as shell fish, prawns, strawberries, eggs, nuts, etc.
3. *Inhalants*—feathers, hair, dust, spores, cosmetics.
4. *Injectants*—Antibiotics, antisera, antispasmodics, analgesics, vaccines.

**Coma of varying depth :**

1. On and off gastrointestinal absorption e g. with meprobamate which forms concretions in the gut.
2 Entero-hepatic circulation.
3 Secondary effect of hypoxia on consciousness.
4. Brief action of narcotic antagonists versus long action of opiates
5 Brief action of glucose versus long-acting hypoglycemic agents.
6 Subdural hematoma.

**Constipation :**

1 *Acute constipation*—Dehydration, acute illness, acute intestinal obstruction, acute appendicitis, hematemesis.

2. *Chronic constipation*—

   (a) *Functional or simple constipation*—(a) *Rectal stasis* (dyschezia)—due to faulty habit, painful anus, impaired consciousness from oversedation. (b) *Colonic stasis*—due to insufficient food intake, insufficient cellulose residue in the food, altered tone of bowel due to endocrine dysfunction, or use of drugs like iron, aluminium hydroxide, codein or morphine, ganglion blocking drugs.

   (b) *Organic constipation*—(a) General medical condition—myxoedema, depressive states, diabetes mellitus, peptic ulcer with pyloric obstruction. (6) Colonic, rectal and pelvic diseases—Proctitis, diverticulitis, megacolon. (c) Pressure on rectum or sigmoid colon—gravid uterus, pelvic tumors.

*Management* of simple constipation—

(a) Bowel habit—Regular period of evacuation each morning.
(b) Diet—High residue diet, plenty of brown-bread, butter, whole fresh fruits, salads, vegetables, at least 4 pints of fluids daily.
(c) Treatment of cause—e.g omission of drugs like codein.
(d) Hydrogogue preparations—to increase the bulk stimulation such as Isogel or Isabgul.
(e) Cathartics—such as senna or bisacodyl if dietary measures not enough, should be given in gradually decreasing doses.
(f) Enema or suppository.

**Cough :**

1. *Infections*—(i) Nose and throat—tonsillitis, pharyngitis. (ii) Larynx, trachea and bronchi—laryngitis, trancheitis, bron-

tis. Recurrent herpes on the penis is common in males (herpes progenitalis)

4. *Keratoconjunctivitis*—This primary form of infection presents with painful conjunctivities, usually unilateral Dendritic ulceration of the cornea may occur and lead to chronic scarring.

B **Skin:**

1. *Recurrent herpes* (herpes labialis)—Fever blisters and cold sores. A few hours before the onset there is a feeling of burning, or pain, this is followed by a crop of vesicles which break down in 48 hours. These crops recur and the attack lasts for 1 week. It commonly occurs on the face at the mucocutaneous junction. There is no scar left after the attack It is precipitated by pneumonia, influenza, malaria, meningococcal meningitis, common cold, strong sunlight, pregnancy and menstruation.
2. *Disseminated herpes simplex*—It is mostly seen in newborn infants The brain, liver, lungs and other organs are involved It is usually fatal.
3. *Eczema herpeticum*—In patients of atopic dermatitis, Herpes simplex sometimes develops into a severe varicelliform eruption.
4. *Herpetic whitlow*—This is probably a true viral wound infection and manifests as an indolent inflammatory lesion, arising at the site of a minor skin trauma, usually on a finger. Superficial vesiculation is often present at some stage.

C **Systemic:**

*Herpetic encephalitis*—Rarely the herpes virus may invade the nervous system during primary infection or during recurrence. The mortality is higher than from other forms of encephalitis.

**Management:** of skin lesions.

1. *Astringent applications*—Wet dressings of 10 per cent Aluminium acetate. Spirit of camphor in the early stages, or between attacks hardens the skin locally, so also 70 per cent alcohol.
2. *Iododeoxyuridine* (IDU)—5% solution in 100% dimethylsulphoxide brushed thrice daily on to oral or cutaneous lesions.
3. *Local grenz ray*—has helped some patients.
4. *Repeated smallpox vaccination*—intervals of one week for six to ten times.

venous pressure producing stagnation and cyanosis—right sided heart failure, tricuspid stenosis, acute or chronic constrictive pericarditis, venous thrombosis. (d) Shock because of vasomotor collapse and stagnation of blood.

3. *Mixed cyanosis*—due to combination of both factors, e g. in cor pulmonale due to pulmonary emphysema.

**Dehydration :**

1. *Failure of fluid intake*—Unavailable, nausea, psychic disorder.
2. *Failure of absorption*—Diarrhoea, intestinal disorders.
3. *Loss from gastrointestinal tract*—Vomiting and diarrhoea.
4. *Excessive renal loss*—(a) Due to renal factors, e.g. failure of renal absorption. (b) Due to pre-renal factors—Disturbed body fluid chemistry e.g. diuretics, cathartics.
5. *Excessive perspiration.*
6. *Loss from burns, wounds, etc.*

**Delirium :**

1 Infections—(a) CNS—Meninigitis, encephalitis, cerebral abscess, GPI. (b) Specific fevers—Pneumonia, typhoid, malaria. septicemia.
2. Cerebral trauma—Post-concussional.
3. Neoplasms—Brain tumors (supratentorial), nonmetastatic manifestation of malignancy.
4. Metabolic causes—Hepatic or renal insufficiency, cerebral oedema, pre-eclampsia or post-partum, alcohol, drugs—sedatives, lead, cocaine, atropine, LSD. dhatura, hasish. amphetamines, steroids.
5. Endocrine—Hyper- or hypothyroidism, hyper- or hypoadreno-corticism.
6. Cerebro vascular disease—Infarct, subdural hematoma.
7. Post-epileptic.

**Dementia :**

1. *Primary cerebral degeneration*—Alzheimer's, Pick's, Huntington's, Jakob-Creutzfelt.
2. *Tumors*—Gliomas, meningiomas, etc. Cerebral metastasses, non-metastatic carcinomatous cerebral degeneration.
3 *Vascular*—Cerebral arteriosclerosis and multiple infarcts, subdural haematoma, repeated cerebral emboli (e.g. occult SBE), anoxia, arteritides.
4. *Infections*—Virus encephalitides, syphilis, subacute/chronic bacterial and fungal meningitis.

5. For post-herpetic neuralgia—(a) Analgesics. (b) Large doses of $B_1$, $B_6$, $B_{12}$. (c) Carbamazepine (Tegretol). (d) X-ray irradiation of the spine. (e) Ergot preparations and iodides

## 10. PITYRIASIS ROSEA

**Definition:** It is an acute, generalized, mildly scaling disease of suspected viral etiology, characterized by a symmetrical eruption of an erythematous maculopapular rash.

**Clinical features:**

*Herald patch*—is the initial lesion noticed anywhere on the body a week or two earlier than the generalized rash It is a large scaly patch larger than the macules to follow.

*Generalised rash*—occurs symmetrically with the long axis parallel to the ribs on the trunk. They are oval macules or papules with a fawn coloured centre and a pink margin of centripedal scales. The lesions occur above the elbows and knees. The face is spared. Pruritus varies from case to case. The lesions disappear in 6-8 weeks.

**Management:** 1. The itching is alleviated with drying and anti-pruritic lotions, like calamine lotion with half per cent menthol or phenol. 2. Erythema doses of ultraviolet light hasten involution of the lesions.

## 11. PSORIASIS

**Definition:** Psoriasis is a heredofamilial chronic, recurrent, inflammatory disease of the skin of unknown origin, characterized by well circumscribed erythematous, dry plaques of various sizes, covered with mica like scales.

**Clinical features:**

*Eruption—Onset and character*—The initial lesion is a papule covered with silvery scales. The papule gradually enlarges peripherally and scales increase to a mass. The removal of the scales exposes a thin membrane (Bulkeley membrane) removal of which gives rise to pinpoint bleeding points (Auspitz sign). *Sites*—The lesions occur predominantly on the extensors of the extremities especially the elbows, knees, sacrum and occiput, but may occur anywhere on the body The lesions are prone to occur at sites of trauma (Koebner's phenomenon).

MORPHOLOGICAL VARIETIES:

1. Punctate psoriasis—Pinpoint size.
2. Guttate psoriasis—Drop size.

3. Sarcoidosis.
4. Tuberculosis—especially primary.
5. Crohn's disease, ulcerative colitis.
6. Leprosy.
7. Miscellaneous—Drug reactions especially sulphonamides, lymphogranuloma inguinale, toxoplasmosis, histoplasmosis, blastomycosis, coccidioidomycosis, psittacosis, catscratch fever, trichophytosis.

**Fatigue :**

1 *Nervous disorders*—(a) Neurasthenia and psycho-asthenia. (b) Lesions of brain, spinal cord, or peripheral nerves.

2 *Myoneural junction disorders*—Myasthenia gravis

3 *Disorder of muscle metabolism*—
  (a) Inadequate oxygen supply to muscles—
    (i) Respiratory—pulmonary fibrosis or engorgement, carbon monoxide poisoning, methemoglobinemia and sulphemoglobinemia.
    (ii) Circulatory—Rheumatic, syphilitis or congenital heart disease, hypertension, coronary artery disease, constricting pericarditis.
    (iii) Vascular lesions—Arteriosclerosis, thromboangiitis obliterans, Raynaud's disease.
    (iv) Hemopoietic—Anemias.
  (b) Diminished carbohydrate supply—Glucose essential for conversion into muscle glycogen—(i) Hypoglycemia due to various causes like adenoma of pancreas, Addison's disease, Simmond's disease, etc. (ii) Impaired utilisation—uncontrolled diabetes mellitus
  (c) Decreased glycogen supply—Thyrotoxicosis
  (d) Lack of essential aminoacids.
  (e) Abnormal creatine metabolism—muscular dystrophies, familial periodic paralysis.

4 *Miscellaneous*—Infections, diseases of limbs, following prolonged inactivity.

**Flatulence :**

1 *Aerophagia* (air swallowing)—(a) Faulty dietary habits—Eating fast, excessive consumption of carbonated drinks, or of tobacco, spicy foods, betel leaves, candies. (b) Psychological—Anxiety, grief, nervous tension (c) Hypersalivation—Gastritis, peptic ulcer. (d) Reflex—Angina pectoris, chronic cholecystitis, hiatus hernia. (e) Dryness of mouth—Dehydration, mouth breathing, anticholinergics.

an erythema dose of ultra violet light given. (c) *Chrysarobin*—1 per cent in ointment base or Anthralin 0.1 per cent is also used. However, this produces conjunctivitis if it goes into the eyes and it stains the clothes. (d) *Steroid ointment*—under an occlusive wrap is helpful in many cases. Intralesional steroids are used in a very resistant plaque.

## 12. LICHEN PLANUS

**Definition:** It is an inflammatory disorder of the skin and mucous membranes, of unknown origin, characterized by violaceous, scaling, angular papules on the flexor surfaces of the skin, and in the mouth, usually resolving in 1 to 2 years.

**Clinical features:** *Lesion*—Violaceous, flat-topped, polyhedral papules with a firmly attached scale. Faint streaks on the surface of the lesions can be seen with a lens (Wickham's striae). Lesions are produced at sites of trauma (Koebner phenomenon). In the mouth it appears as spots, streaks, or a lacy network. *Sites*—Bilaterial and symmetrical: Front of the wrists, flexor surface of forearm, legs, back, genitals, mouth, nails are the common sites. Itching, severe at times.

**Varieties:**

1. Annular lichen planus—Ringed lesions
2. Hypertrophic lichen planus—Thick plaques at the above sites.
3. Linear form—along the nerves
4. Lichen planopilaris—Follicular papules with spines
5. Lichen obtusus—Dome shaped papules with smooth surface on the back commonly.
6. Acute generalized lichen planus—Acute onset with involvement of the entire body in 24 hours.
7. Vesicobullous form.
8. Atrophic form—lesions heal with atrophy.
9. Tropical lichen planus—occurs in sun exposed areas

**Management:**

1. *Mental relaxation*—especially for those under tension. Sedatives or tranquillizers may be used.
2. *Steroids*—are given to generalized cases Under steroid therapy lesions may flatten out, but often tend to recur on stopping treatment. Local steroids like Fluocinolone acetonide or betamethasone valerate are useful when there are a few patches. Intradermal steroids are the best for the chronic patches.

**Hiccough:**

1. *Abdominal*—Transient following over-distension of stomach with food or drink or irritation of stomach e.g. from alcohol. Peritonitis, diaphragmatic pleurisy, intestinal obstruction, after abdominal operations, subphrenic abscess, gastric dilatation, abdominal carcinoma, liver abscess, abdominal Hodgkin's disease, crisis (diaphragmatic) of tabes dorsalis
2. *Thoracic*—Fibrous mediastinitis, cardiac enlargement, mediastinal tumors, adherent pericarditis, aortic aneurysm, oesophageal tumors.
3. *Cerebral*—Tuberculous meningitis, encephalitis, brain tumor, hydrocephalus, disseminated sclerosis, focal epilepsy, chorea, locomotor ataxia, arteriosclerosis.
4. *Toxic*—Uremia, acidosis, severe systemic infections, anoxia, alcoholism.
5. *Functional*—e.g. following bouts of laughter or swallowing: or evidence of hysteria.
6. *Without demonstrable cause.*

*Management*—

1. *Removal or control of primary cause*—when possible.
2. *Physical or mechanical measures*—(a) Holding the breath. (b) Breathing in and out of a paper bag. (c) Compression of carotid sinus or eyeballs. (d) Stimulation of the pharynx to induce vomiting. (e) Spraying the abdomen under the costal margins with ethyl chloride (f) Washing out the stomach if gastric dilatation.
3. *Drugs*—(a) Antispasmodics—(i) Octin—10-15 drops of 10% solution in water or dragees, or subcutaneous or IM, may be repeated 3-hourly till satisfactory response. (ii) Atropine—1/100 gr. subcutaneously. (b) Chlorpromazine or promazine—50 mg. by mouth or IM. (c) Carminatives—When there is gastric irritation, a strong carminative mixture, or oil of cloves or oil of cajaput 5 m. on a lump of sugar. (d) Local anaesthetic orally—Xylocaine one desertspoon ½ hour after preliminary injection of atropine. (e) Metoclopramide monohydrochloride—10 mg. by mouth, IM or IV, may be repeated 8-hourly. (f) Morphine with atropine if signs of exhaustion. (g) Basal narcotic—Prolonged IV administration in resistant cases.
4. *Carbon dioxide*—Inhalation of 7% carbon dioxide in oxygen stimulates the respiratory centre.

(c) *Electrocauterization*—under local anaesthesia gives the best results. The recurrence rates are minimal. Any type of wart may be cauterized.

(d) *"Suggestion"*—is sometime sufficient to clear warts.

## 14. ERYTHRODERMA

**Definition:** Exfoliative dermatitis is a universal scaling or exfoliation of the skin, occurring primarily by itself, or secondary to some pre-existing skin disease or drug toxicity.

**Causes:**

1. Hereditary conditions—Icthyosiform erythrodermia, pityriasis rubra pilaris.
2. Psoriasis and eczemas—contact, atopic, seborrhoeic and other eczema.
3. Drugs—Organic arsenic, gold, mercury, penicillin, barbiturates and isoniazid.
4. Pemphigus foliaceus.
5. Leukemias and reticulosis.

**Clinical features:** Sudden onset, with patchy erythema which rapidly spreads all over in 1-2 days, together with fever, shivering and malaise Scaling starts after 2-6 days. The scales may be large or fine like bran The whole skin becomes red, warm to touch and is thickened. The hair is brittle and falls. The nails appear dull, ridged and may be shed.

**Management:** General—

1. Bed rest is essential.
2. The environmental temperature must be regulated to keep the patient comfortable
3. Daily bath followed by local application of oily lotion.
4. Diet with high proteins and amino acids
5. BAL for arsenic, bismuth, mercury and gold dermatitis. Injections of 2 ml. at 4-hourly intervals for 1 day, followed by 2 ml twice a day for 3 days, and 2 ml. daily on the fifth and sixth days
6. Steroids—30-40 mg. prednisolone daily till improvement The dosage is then reduced, and the patient is kept on a maintenance dose.

## 15. VENEREAL DISEASES

**Introduction:** All venereal diseases are sexually transmitted, however not every disease which is transmitted sexually is a venereal disease The term venereal disease implies a chain of sexual contacts Non-venereal sexually transmitted diseases

**Hyperventilation:**

1. Anxiety or hysteria.
2. Pain.
3. Drugs—Salicylates, analeptics, adrenaline.
4. Increased metabolism—Pyrexia, hyperthyroidism.
5. Metabolic acidosis.
6. Anoxia.
7. Lung disease—Atelectasis, pneumothorax, irritant gases
8. Hypotension.

**Hypotension** (*Low blood pressure*):

1. *Symptomatic*—Addison's disease, Simmond's disease, shock, myocardial infarction, emphysema, pulmonary tuberculosis, etc.
2. *Constitutional permanent hypotension*—occurs in about 3% of healthy individuals; more common in females.
3. *Orthostatic hypotension*—Transient low B.P. on changing from horizontal to erect position, or sometimes, at onset of slight exertion.

*Management* of postural hypotension—

1. Extra pillows under the head at night.
2. Extra sodium chloride in diet because salt causes retention of fluids in tissues which has a sort of binding effect on the capillaries
3. Abdominal binder may help
4. Drugs which raise blood pressure such as mephentermine sulphate 20-25 mg. b d Amphetamine (5-10 mg.) may be useful.

**Increased intracranial pressure:**

1. Space-occupying lesions: (a) Of frontal lobe or non-dominant temporal lobe. (b) In connection with the ventricular system—e.g. papilloma of choroid plexus, colloid cyst of 3rd ventricle (c) Causing distortion of ventricular system—e.g craniopharyngioma.
2. Congenital abnormalities affecting the ventricular system —e g aqueduct stenosis, basilar impression, Arnold-Chiari malformation.
3. Benign intracranial hypertension (Pseudotumor cerebri).
4. Hypertensive encephalopathy.
5. Chronic pulmonary disease with hypercapnoea and hypoxia.
6. Chronic meningitis or adhesive arachnoiditis and/or aqueductal stenosis.

The regional lymph nodes are bilaterally enlarged. They are discrete, rubbery in consistency, and not tender.

SECONDARY SYPHILIS—

1. *Constitutional symptoms*—Headaches, fever, malaise, and arthralgia which is worse at night.

2 *Cutaneous lesions*—The general features of the rash are—(i) Symmetrical distribution of abundant lesions. (ii) Polymorphism. (iii) Non-pruritic. (iv) The raised lesions are indurated (v) More on the central parts of the body. (vi) Lesions are tender on pressure. The types of rashes are—(a) Macular roseola— rose coloured spots on the chest and upper arms. (b) Papular syphilide—This is the commonest eruption. The papules are coppery in colour, firm, with a scaly margin, commonly on the face, palms, soles, and flexor aspect of the face, arms and legs. Condylomata lata are flat, moist, raised papules found at moist sites such as groins, axilla and around the genitalia. Other papular varieties are—(i) Follicular syphilide—around the hair follicles. (ii) Framboesiform syphilide—Large papules crusted with dry serum (iii) Corymbose syphilide—Large papule surrounded by small papules. (c) Pustular and ulcerative syphilis.

3. *Generalised lymphadenopathy*—All the lymph glands are enlarged but not tender.

4. *Mucous patches*—These are white plaques, which are easily eroded and leave behind erosive ulcers—snail track ulcers. They occur in the mouth, prepuce and vulva.

5 *Other features*—Moth eaten alopecia, iritis, hepatitis, nephrosis, arthritis, epididymitis, and a leucomelandoderma are sometimes encountered.

LATENT SYPHILIS—With or without treatment the visible manifestations of syphilis disappear. If in such cases the blood serologic test remains positive, it is called Latent Syphilis. The C S.F. of these patients should have no evidence of the disease.

(a) *Early latent syphilis*—The patient has had the disease for less than 2 years

(b) *Late latent syphilis*—These patients are known to have the disease for more than 2 years

2 **Late syphilis:**

It occurs in patients who have not taken or taken inadequate treatment.

BENIGN TERTIARY SYPHILIS—The stage of syphilis starts 3-10 years after the primary stage. The characteristic lesion in this

**Melena** (Tarry stools) :

1 *Swallowed blood.*
2. *Oesophageal and gastric causes*—(a) Ruptured oesophageal varices—cirrhosis of liver, portal hypertension. (b) Hemorrhagic gastritis. (c) Gastric ulcer or duodenal ulcer, or hiatus hernia.
3. *Intestinal causes*—(i) Primary—(a) Carcinoma of intestinal tract. (b) Typhoid fever. (c) Regional ileitis. (d) Amoebic dysentery. (e) Ulcerative colitis. (f) Colonic and sigmoid polyposis. (g) Peptic ulcer in Meckle's diverticulum. (h) Mesenteric infarction. (i) Ankylostomiasis. (ii) Secondary to systemic disease—(a) Purpura and other hemorrhagic disorders. (b) Polyarteritis nodosa.

**Nasal regurgitation of fluid :**

1. Bulbar and pseudo-bulbar palsy.
2. Acute bulbar paralysis—Myasthenic crisis, poliomyelitis, diphtheria, rabies, encephalitis, polyneuritis, botulism.
3. Polymyositis and dermatomyositis.
4. Muscular dystrophy.
5 Myotonia dystrophica.
6 Paralysis of tenth nerve by inflammatory, neoplastic or vascular lesion (posterior inferior cerebellar artery thrombosis).

**Nystagmus :**

1. *Congenital and familial*—associated often with albinism or astigmatism.
2 *Acquired*—
   (a) *Of retinal origin*—(i) Miner's nystagmus due to chronic eye strain. (ii) Optico-kinetic nystagmus (railway nystagmus). (iii) Amblyopia.
   (b) *Labyrinthine*—(i) Thermic—by inducing a temporary current in endolymph by injection of warm water into the ear. (ii) Rotation nystagmus. (iii) Disease of labyrinth.
   (c) *Central lesions*—Cerebellar tumor or abscess, multiple sclerosis, Friedreich's ataxia and other hereditary ataxias, encephalitis, syringomyelia, vascular lesions of brain stem and cerebellum.
   (d) *Due to spinal cord lesions*—Lesion of cervical region of spinal cord sometimes.

**Management:**

1. *Early syphilis*:
   (a) Benzathine Penicillin 2.4 mega units.
   (b) Procaine Penicillin G in oil with 2 per cent aluminium monostearate (P.A.M.) 4.8 mega units (2.4 mega units at one time followed by 1.2 mega units for 2 injections three days apart).
   (c) Procaine Penicillin G 6 lac units daily for 8 days.
2. *Late syphilis*:
   (a) Benzathine Penicillin—6-9 mega units in divided doses.
   (b) P.A.M.—2.4 mega units stat, then every 3rd day for 6-10 injections.
   (c) Other antibiotics—if patient is allergic to penicillin. Erythromycin 500 mg. q.d.s. for 3 to 4 weeks. Tetracycline is another alternative but should be avoided during pregnancy. Dose—30-40 g. over 10-15 days.

B. **Congenital syphilis** (See Chapter X).

## Gonorrhoea

**Definition:** Gonorrhoea is an infectious disease caused by the gonococcus Neisseria gonorrhoeae. In the male the disease is most often an anterior urethritis, whereas in a female it is a cervicitis In both sexes it may give rise to complications

**Clinical features:** Gonorrhoea can occur in the male, female, child and infant.

*In males*—Incubation period—2-5 days Symptoms—There is a thick creamy, greenish yellow purulent discharge. Severe pain during micturition together with frequency and urgency occur. The symptoms are more marked with a posterior rather than an anterior urethritis.

*In females*—The usual complaints are those of discharge, dysuria, frequency and urgency. Most of the cases become aware of the infection because some male has complained of an infection after intercourse. On examination the infection may be seen localized to the urethral appendages or cervix.

*In the child*—The disease is essentially a vulvovaginitis and is acquired from contaminated towels, infected parents, or sexual assault

The initial feature is difficulty in walking, soreness around the parts, severe burning while passing urine, and a purulent discharge. The vulva is swollen and reddened, with a slight discharge.

aortic regurgitation. Following lumbo-dorsal sympathectomy for hypertension, associated with transient postural hypotension.

2. *Non-cardiac disease*—Effort syndrome, flatulent indigestion especially gall-bladder dyspepsia, anemia, pulmonary tuberculosis, thyrotoxicosis, embarrassment of heart due to local pressure, e.g. pleural effusion, pneumothorax, tympanitis, ascites or pregnancy. Hypertensive crisis of pheochromocytoma.
3. *Non-organic disease*—After violent exertion or emotional upset specially in sensitive individuals, convalescence from a debilitating disease, excessive smoking, tea, coffee, or alcohol, functional cardiac arrhythmias, anxiety, neurosis.

**Paralysis of one arm:**

*Acute*—

1. Cerebrovascular lesion.
2. Encephalitis.
3. Multiple sclerosis.
4. Poliomyelitis.
5. Neuritis.
6. Hysterical paralysis.

*Chronic*—

1. Tumor in arm area of brain e.g. meningioma.
2. Lesion of brachial plexus—neoplastic compression, trauma at birth, cervical rib or scalenus anticus syndrome.
3. Syringomyelia.
4. Muscular dystrophy, motor neurone disease, polyneuritis may be confined to one limb for a time.

**Paralysis of one leg:**

*Acute*—

1. Thrombosis of paracentral artery.
2. Multiple sclerosis.
3. Cauda equina lesion.
4. Sacral plexus lesion.
5. Hysterical.

*Chronic*—

1. Localised lesion of brain stem e.g. multiple sclerosis.
2. Parasagittal meningioma.
3. Compressive or infiltrative lesion in dorsal or lumbar region of spinal cord.
4. Brown-Sequard syndrome.

**Management :**

1. Penicillin is the drug of choice. (a) For uncomplicated gonorrhoea in males—Procaine Penicillin G 2,400,000 units in one intramuscular injection. (b) For uncomplicated gonorrhoea in females—Aqueous procaine penicillin G 4,800,000 units I M divided into two injection sites. (c) For ophthalmia neonatorum—Penicillin is given locally as drops, and systemically Procaine Penicillin 3 lac units daily by I.M. injection.
2. Tetracyclines, erythromycin and chloramphenicol 500 mg. 6-hourly upto 2-4 grams.
3. Ampicillin in a single dose of 3.5 gm.
4. Co-trimaxozole—2 tablets b.d. for 5 days or 4 tablets b.d. for 3 days.
5. Kananamycin and Spectinomycin in penicillin resistant granulomas.

## Chancroid

**Definition :** It is an acute, venereally transmissable, auto-inoculable disease of individuals with poor personal hygiene, and is caused by Ducrey's bacillus, a gram negative Strepto-bacillus called Hemophilus ducrey.

**Clinical features :** *Incubation period*—3-5 days. *Lesion*—Starts as a papule and rapidly ulcerates. The ulcers are multiple, shallow, ragged with an undermined edge. Floor covered with necrotic slough Margin is red, it is not indurated. Tender and painful It is autoinoculable. *Site*—Fraenum, corona, glans and external urinary meatus in males. Labia, vulva, clitoris, cervix, urethra in females. Associated feature—Inguinal adenitis usually unilateral, firm and tender.

**Complications :**

1. *Bubo formation*—The inguinal glands begin to suppurate, they soften, fluctuate, get fixed to the skin and rupture with a single opening on the skin.
2. *Phagedena*—It results from secondary infection with Vincent's spirillum and fusiform bacillus. There is extensive ulceration and destruction of tissue of the prepuce and shaft of the penis.

**Diagnosis :**

1. Smear of the pus or unruptured bubo stained by Grams method is made and the causative organism H. ducreyi identified.

hepatolenticular degeneration, rheumatoid arthritis, polyarteritis nodosa.

**Prolonged ankle tendon reflex duration:**

1 Hypothyroidism.
2. Obesity.
3 Gross oedema.
4. Drugs—Propranolol, reserpine, quinidine, bromides.
5. Diabetes mellitus.
6 Arteriosclerosis
7. Sarcoidosis
8. Neurosyphilis.
9. Parkinson's disease.
10. Hypokalemia.
11. Myasthenia gravis

**Pruritus:**

GENERALISED PRURITUS—

1. Allergic manifestation.
2. Skin diseases—Scabies, pediculosis, urticaria, lichen planus, dermatitis herpetiformis, lichen simplex chronicus.
3. Systemic disease—Diabetes, liver disease, uremia, Hodgkin's disease, leukemia, polycythemia, certain anemias, some malignant tumors, carcinoid syndrome.
4 Drugs—Morphine, chloroquine, cocaine.
5. Psychogenic
6 Pregnancy.
7. Senile pruritus.

LOCALISED PRURITUS—

1. *Pruritus ani*—Threadworms, proctitis, hemorrhoids, anal fissure, broad-spectrum antibiotics, neurodermatitis.
2. *Pruritus vulvae*—Functional associated with nervous exhaustion, trichomonal vaginitis, vaginal discharge e.g. gonorrhoea or chronic cervicitis, diabetes, local use of chemicals, menopausal, kraurosis vulvae, senile vaginitis, lichen sclerosus et atrophicus, thread worms.
3. *Pruritus of male genitals*—Scabies, tinea infection, psychogenic.
4. *Other sites*—(a) Ear—Fungus infection or chronic otitis media (b) Eyelids—Neurodermatitis. (c) Nostrils—intestinal parasites, brain tumor.

**Ptosis:**

1 Congenital.
2. Oculomotor nerve paralysis.

**Complications:**

1. Multiple discharging sinuses in the inguinal region.
2. Elephantiasis of the genitalia due to abscesses along the course of the lymphatics, which destroy the lymphatics occur in a few weeks upto 20 or more years, resulting in elephantiasis of genitalia in both sexes.
3. Rectal stricture in females due to involvement of perirectal glands.

**Diagnosis:**

1. *Smear*—A smear of the pus fixed with methyl alcohol and stained with Giemsa stain to identify Halberstaedter-Prowazek inclusion bodies, or fixed in acetone for fluorescent staining of Chlamydix.
2. *Culture*—The pus may be used for culture in BHK 21 or McCoy cells.
3. *Frei test*—It is an intradermal test. The antigen is prepared from an infected yolk of chick embryo. 0.1 mm. is injected into the forearm and the result read after 48 hours—a nodule of 6 mm. size is considered positive Once positive, the test is positive for life.
4. *Complement fixation test.*
5. *Biopsy*—very helpful.

**Management:**

1. *Sulfonamides*—1 gm. four times a day for 7-14 days.
2. *Tetracyclines*—250-500 mg four times a day for 10-15 days.
3. *Surgical*—Aspirate the buboes if they are fluctuant.

Rectal strictures require dilatation with bougies.

## Granuloma Inguinale

**Definition:** It is a chronic, mildly contagious disease and is characterized by progressively destructive ulceration around the genitals. It is caused by Donovania granulomatis which are gram negative large oval bodies found in the intracytoplasmic cystic spaces of large mononuclear cells.

**Clinical features:** *Incubation period*—8-80 days *Lesion*—It starts as a papule or nodule, which soon ulcerates leaving an ulcer that is beefy red in colour. It usually occurs on the glans penis in males, and the vulva or vagina in females The lesion enlarges by development of satellite lesions and gradual peripheral extension, the edges become rolled and overlapped.

tract infection, trichomoniasis, candidiasis, endoscopic trauma, foreign bodies, urethral stricture, intraurethral warts, syphilitic lesions, crystalluria, allergy, herpesvirus hominis type II

**Thickened nerves** (Hypertrophic neuropathy) :

1. Leprosy.
2 Neurofibromatosis.
3. Charcot-Marie-Tooth type.
4. Dejerine-Sottas type.
5. Refsum syndrome.
6. Acromegaly.
7. Diabetes mellitus.
8. Anyloidosis.
9. Sarcoidosis.
10. Relapsing neuropathies of unknown etiology.

**Tinnitus :**

1. *Ear disease*—(a) External ear—excessive wax, aural polypi, or foreign body. (b) Middle ear—acute or chronic otitis media, Eustachian block. (c) Internal ear—Meniere's disease, specific fevers, extension of suppuration to labyrinth from middle ear, fracture base of skull.
2. *Auditory nerve*—Auditory nerve neuronitis, drugs such as streptomycin, salicylates; pressure from tumor or by new bone formation as in osteitis deformans.
3 *Pons*—Vascular or neoplastic lesions of lateral aspect.
4. *Cerebrum*—Temporal lobe epilepsy
5. *General diseases*—Anemia, leukemia, aortic incompetence, uremia, arteriosclerosis with hypertension. During attacks of neuralgia or migraine.

**Vomiting** (and nausea) :

1. *Reflex*—

(a) Abdominal—

Gastric causes—(i) Diseases—Acute and chronic gastritis, ulcer or carcinoma, syphilis, pyloric spasm or stenosis, venous congestion as in portal obstruction and cirrhosis of liver. (ii) Chemical agents and poisons—food poisoning, corrosives and irritants, emetics like hypertonic salt solution, copper sulphate.

Extragastric—Appendicitis, intestinal obstruction, spasm as in lead poisoning, intestinal worms, biliary and renal colic, pancreatitis, and due to stimuli arising from disease of urinary bladder or uterus.

# 13. Acute Poisoning

I. **Removal of unabsorbed poison—**

A. Ingested poison

(1) *Induced vomiting*—Should be attempted only if patient is fully conscious and co-operative; in a drowsy or semiconscious patient there is risk of aspiration into respiratory tract. Contra-indicated in corrosive poisoning because of risk of oesophageal rupture *Methods of inducing vomiting*—(a) Tickling the back of pharynx with fingers or handle of a spoon. If not successful it can be repeated after making patient swallow warm water. (b) Ingestion of hypertonic saline solution (c) Syrup of ipecac —15 ml. by mouth followed by large amounts of water. May be repeated if necessary after ½ hour. (d) Apomorphine hydrochloride 5 mg subcutaneously.

(2) *Gastric lavage*—by nasogastric intubation with Ryle's tube and flushing the stomach with large quantities of fluid. *Indications*—(a) Patient drowsy or unconscious. (b) Patient conscious but unco-operative as in suicidal attempt. *Contraindications* —(a) Corrosive poisoning because of danger of rupture of oesophagus. (b) Strychnine poisoning because it may precipitate convulsions. (c) Kerosene poisoning because aspiration of even small quantity into respiratory tract may cause pneumonia. *Precautions*—Gastric lavage is most helpful if performed within 4 hours after ingestion of poison. Due precautions should be taken to prevent aspiration in unconscious patient such as head low position, turning the head to one side, and suction of nasopharynx after the procedure. *Lavage fluid*—Warm water serves the purpose, in babies saline. Special solutions should be used in opium poisoning (potassium permanganate), glutethimide (castor oil), and iron poisoning (desferrioxamine). After lavage all fluid should be removed except in iron poisoning.

(3) *Adsorbents*—may be used alone or in combination with emesis or washout, but must be administered within one hour of ingestion of the poison. Refined, activated charcoal 5-10 g. by mouth in 100 ml. water, repeated at 20 minute intervals upto 50 g. or resin preparations can adsorb and inactivate a number of drugs within the stomach lumen

II. ENDOGENOUS FACTORS—

1. Endocrine disorders—(a) Addison's disease. (b) Thyrotoxicosis. (c) Diabetes mellitus. (d) Simmond's disease.
2. Hepatic disorders—Cirrhosis of liver, liver abscess.
3. Respiratory diseases—Pulmonary tuberculosis, chronic lung abscess, bronchiectasis.
4. Blood diseases—Leukemia, Hodgkin's disease.
5. Cardio-vascular—malignant hypertension, subacute bacterial endocarditis.
6. Kidney diseases—Chronic nephritis, pyonephrosis.
7. Nervous disorders—Progressive muscular atrophy.
8. Malignancy—Cancer stomach, bronchogenic carcinoma, etc.
9. Psychosis—Schizophrenia, anorexia nervosa.
10 Drug addiction.
11. Collagen diseases.

## 18. THE FUNDUS

**Changes in retinal vessels and retina:**

1. *Hypertension*—(a) Minimal changes in the retina with only mild attenuation or sclerosis of the arterioles; mild depression of veins at the points of arteriolar crossing. (b) Moderate to marked sclerosis with increased lustre of arterioles (coppery colour or copper wire arteries) and compression of veins at the points of arteriolar crossing. (c) Polished silver colour of arterioles ("silver wire" artery); widening of arteriovenous crossing spaces, with changes in the course of and dilatation of the veins. (d) Arterioles visible only as fibrous cords

   *Malignant hypertension* (Retinopathy)—(a) Diffuse and marked contraction of retinal arteries, (b) swelling of optic nerve resembling papilloedema, (c) numerous flame shaped superficial hemorrhages. (d) "cotton wool" exudates in retina, (e) star shaped figure at the macula.

2. *Retinitis*—is characterised by the presence of exudates and hemorrhages in the retina; the exudate interrupts the vessels. Papilloedema is a late sign. Causes—Hypertension, nephritis, diabetes, leukemia and severe anemia. In albuminuric retinitis there are large flame shaped hemorrhages and cotton wool exudates. In diabetic retinitis the hemorrhages and exudates are usually small and round and hard (well defined), a mild degree of papilloedema may be present.

3. *Hemorrhages*—(a) Of hematological origin—Diabetes mellitus, severe anemia, bleeding diathesis, leukemia, hyper-

(b) HAEMODIALYSIS AND HAEMOPERFUSION—Haemoperfusion can be life saving in severe cases of overdose with barbiturates, ethchlovynol, glutethimide, mebrobamate, methaqualone, salicylates, trichlorethanol derivatives such as chloral hydrate, and theophyllin

III. **Administration of antidote**—e.g. oxygen for carbon monoxide poisoning, Naloxone for morphine, pethidine and methadone, cobalt edetate (20 ml of 1 5 solution in glucose) to counteract cyanides if given soon enough (d) Berlin blue inactivates thallium (e) Methionine or cysteine for paracetamol overdose.

IV. **Maintenance of vital functions**—

RESPIRATION—(1) *Maintenance of patent airway*—by repeated suction of throat and nasopharynx. Preventing tongue from falling back by pulling the jaw forwards or use of J-shaped metallic airway. Endobrobronchial suction if profuse secretions, or collapse of lobe or lung segment from bronchial obstruction Trachesotomy if prolonged coma with profuse secretions or in cases requiring assisted mechanical respiration. (2) *Mechanical respiratory support*—for medullary or peripheral neuromuscular paralysis as in barbiturate, opium and organophosphorus poisoning Ambu's bag can be used if respirator is not available, when artificial respiration is required only for a short time, or in case of emergency. (3) *Oxygen*—by intranasal catheter or mask.

(2) CVS—(a) *Hypotension and shock*—(i) Raise foot of the bed. (ii) Increase circulatory volume by plasma expanders IV. Care must be taken to avoid fluid overload and pulmonary oedema. A CVP line should be inserted and the rate of infusion carefully regulated (iii) Vasopressors—Isoprenaline 20 μg./minute IV or Dobutamine 2 5-10 μg /kg./minute IV. (b) *Cardiac arrhythmias*—associated with antidepressant overdosage may disappear when anoxia or acidosis are corrected and it is only necessary to prescribe antiarrhythmic drugs if cardiac output is affected

(3) RENAL FUNCTION—Careful record of fluid balance, electrolyte status and blood picture (particularly PCV) should be kept to guide treatment and diuretics should be given with caution.

(4) HYPOTHERMIA—Patient should be covered with blanket to reduce heat loss and nursed in an atmosphere of moistened air at about 27-29°C.

(5) CONVULSIONS—Controlled with IV diazepam. Curarization with intensification of ventilatory control if intractable.

(6) INFECTION—Should be treated with antibiotics.

11. *Tuberous sclerosis*—Pale white mass on or very close to the nerve head appearing like a small bunch of grapes; usually associated with cystic masses in the brain.
12 *Tumors*—Neuroblastoma or metastatic tumors. Angiomatosis of retina may be associated with angioma in cerebrum or cerebellum.
13 *Detachment of retina*—may occur in severe inflammatory, exudative or degenerative process affecting the eye, in intraocular tumor and following trauma.

**Choroid—**

1. *Choroiditis*—(a) Tuberculous—Minute miliary tubercles which appear as discrete, widely separated, greyish white masses, pathognomonic of tuberculous meningitis or miliary tuberculosis. (b) Syphilis—gummatous or multiple greyish-yellow dust like vitreous opacities (c) Toxoplasmosis. (d) Sarcoidosis.
2. *Vascular lesions*—Endarteritis may occur in syphilis.
3. *Tumors*—Melanomas or metastatic tumors.

**Optic disc—**

1. *Papilloedema* (Choked disc)—is a swelling of the nerve head. The colour of the disc becomes redder and its contour becomes blurred. Causes—
   (a) Increased intracranial pressure—due to space occupying lesion, or due to circulating block—aqueductal stenosis, intra-ventricular tumors, or outflow block of 4th ventricle.
   (b) Due to cerebral oedema—After head injury or cerebral anoxia, benign intracranial hypertension, vitamin A intoxication, steroid withdrawal, lead poisoning.
   (c) Malignant hypertension.
   (d) Raised CSF protein or altered blood products—subarachnoid hemorrhage, chronic meningitis, Gullain Barre syndrome, spinal cord tumors.
   (e) Metabolic disorders—Hypercapnia, hypocalcemia particularly in childhood, malignant exophthalmos.
   (f) Circulation disorders—Central retinal vein thrombosis, lateral sinus thrombosis, superior vena cava obstruction, polycythemia rubra vera, multiple myelomatosis, macroglobulinaemia, hyperlipaedemia, diabetes mellitus, vasculitis including temporal arteritis.
2 *Papillitis*—(Retrobulbar neuritis)—Oedema of nerve head, retinal veins engorged and tortuous, and hemorrhages. Papillitis tends to produce a large central scotoma with poor

| Severity | Initial dose (till atropinised) | Subsequent dose |
| --- | --- | --- |
| Mild .. | 1.2 mg IM repeated every 15-20 mts | 1.2 mg IM 6-hourly for 24 hours. |
| Moderate .., | 6 mg IV initially, repeated by IM route if necessary | 1.2 mg IM 6-hourly for 24-48 hours |
| Severe .. | 12-18 mg. IV repeated as often as necessary IV | 1.2 mg. IM 4-hourly for 24-48 hours<br>Close watch necessary upto 5-7 days for reappearance of miosis and pulmonary oedema |

(b) *Oximes*—e.g. PAM (Pyridine-2-aldoxime methiodide). Dose—1 gm. by IV injection or slow infusion in saline, to be repeated after 30 minutes if necessary. In case of severe poisoning when paralytic complications are expected it may be repeated after 12 hours and 24 hours Oximes should be administered as early as possible after ingestion of poison, if given after 24 hours they are of little help. Oximes are not easily available and are reserved for cases of severe poisoning or cases with marked 'nicotinic' features such has fasciculations and paralysis.

3. *Management of complications*—(i) Pulmonary oedema—Suction of throat and nasopharynx to remove froth and maintain patent airway. (b) Oxygen. (c) IV atropine till appearance of signs of adequate atropinisation in order to reduce bronchial secretions. (d) IV Frusemide 60-80 mg. (e) Tracheostomy if respiratory paralysis (ii) Respiratory paralysis—May occur in acute stage due to severe poisoning or as a delayed complication after initial period of improvement often associated or preceded by palatal paralysis and facial palsy It can be detected early by measuring chest expansion at frequent intervals. Intermittent positive pressure respiration is used. Antibiotic cover to prevent bronchopneumonia. (iii) Medullary paralysis—Fluctuations in pulse rate and blood pressure. Cardiac arrhythmias and profound hypotension may occur in terminal stages.

## Barbiturate poisoning

**Clinical features :** Impairment of consciousness, varying from drowsiness to deep coma, hypotonia of limbs, depression of deep

**Corpuscular values of erythrocytes:**

| *Indices* | *Calculation* | *Normal values* |
|---|---|---|
| MCV | PCV × 10 / RBC in million | 76-96 fl. (femtolitres) |
| MCH | HB × 10 / RBC in million | 27-32 pg. (picogram) |
| MCHC | HB / PCV × 10 | 32-36% |

MCV is most important of indices in presence of anemia Low—Iron deficiency anemia, thalassemia trait, anemia of chronic disease High—Vitamin B12 or folate deficiency, or one of the causes of macrocytosis. or one of the causes of macrocytosis with normoblastic marrow. Normal MCV in anemia—Acute blood loss, combined vitamin B12 and folate deficiency with iron deficiency or thalassemia trait, and in many primary hematological disorders such as hemolytic anemia, myeloproliferative disorders and marrow infiltration.

**Leucocytes**

| | | | |
|---|---|---|---|
| Total | Infants | 10,000-20,000/c mm | (10.0-20.0×10⁹/1) |
| | Children | 8,300-10,000/c mm. | ( 8 3-10.0×10⁹/1) |
| | Adults | 6,000-10,000/c mm. | ( 6 0-10 0×10⁹/1) |

| *Percentage of leucocytes* | *Adults* (per cent) | *Children* (per cent) |
|---|---|---|
| Metamyelocytes | 2-5 | 3-8 |
| Polymorphs | 54-60 | 16-60 |
| Lymphocytes | 25-33 | 42-48 |
| Eosinophils | 1-3 | 1-3 |
| Basophils | 0 25-0.5 | 0 25-0 5 |
| Monocytes | 3-7 | 3-5 |

LEUCOCYTOSIS (*Neutrophilia*)—

1. *Physiological*—(i) New-born infant, (ii) following meals. (iii) strenuous exercise, (iv) convulsive seizures, (v) extreme heat or cold, (vi) pregnancy, (vii) emotional disorders, (viii) ultra-violet exposures, (ix) ether anaesthesia, (x) attack of paroxysmal tachycardia
2. *Pathological*—(a) Infections—(i) Local—pneumonia, empyema, furunculosis, perinephric or appendicular abscess (ii)

tres. (ii) Blood barbiturate level is high to begin with (10 mg./100 ml or more) or continues to rise under observation. (iii) Patient fails to improve or deteriorates inspite of forced diuresis (iv) Presence of renal disease *Contraindications*—Presence of bleeding piles or peptic ulcer which contraindicates anticoagulation As patient improves after dialysis or forced diuresis a close watch must be kept for next few days as re-excretion into the circulation of the poison bound to tissue proteins may cause a relapse.

## Acute alcoholic intoxication

**Clinical features:** Characteristic smell of alcohol.

*Mild intoxication.* Rowdiness, disorientation, irrelevant talk, incoordination.

*Moderate intoxication·* Unconsciousness, hypotonia, depressed jerks. Pupils normal or slightly dilated

*Severe intoxication*: Deep coma, loss of jerks, extensor plantars, dilated pupils, irregular breathing Death from medullary paralysis.

**Management:**

1. *Removal of unabsorbed poison*—by gastric lavage.
2. *Correction of hypoglycemia*—with 50 ml 50% glucose IV Blood should be collected for sugar estimation before giving glucose. In mild intoxication further treatment is not necessary. In moderate to severe intoxication patient may continue to remain drowsy for 4-6 hours and 5% glucose drip should be continued with high doses of vitamin B complex.
3. *Mannitol*—350 ml. of 20% solution IV if patient fails to improve
4. *If patient continues to be comatose*—the possibilities are—(a) *Mixed poisoning*—such as simultaneous ingestion of alcohol and barbiturates or other narcotics (b) *Head injury*—due to fall. Lumbar puncture should be done to rule out subarachnoid hemorrhage (c) *Hepatic coma*—may be precipitated in a chronic alcoholic with liver cell failure by a bout of alcohol.
5 *Contamination of alcohol with methyl alcohol*—Metabolism of methyl alcohol in the body results in the formation of toxic products like formaldehyde and formic acid Clinical manifestations are dimness of vision (irreversible blindness in severe cases), acidotic breathing, altered state of consciousness, convulsions, coma and death Management—

typhoid. (ii) Protozoal infections—malaria, kala-azar, trypanosomiasis. (iii) Glandular fever. (iv) Hodgkin's disease. (v) Monocytic leukemia (vi) Tetrachlorethane poisoning.

LEUKEMOID BLOOD PICTURE—A leukemoid reaction is an excessive leucocyte response to a stimulus that results in lesser degree of leucocytosis or immaturity in the circulating cells.

*Neutrophilic leukemoid reaction*—(i) Hemolytic crisis in hemolytic anemia. (ii) Hemorrhage. (iii) Hodgkin's disease. (iv) Infection—Tuberculosis (also lymphocytic), pneumo, meningo, or staphylococcus infection, gas gangrene, diphtheria, leptospirosis, malaria, congenital syphilis (also lymphocytic). (v) Burns. (vi) Eclampsia (vii) Mustard gas poisoning. (viii) Vascular thrombosis and infarction e.g. mesenteric infarction (ix) Marrow replacement by tumors including multiple myeloma, myeloid metaplasia.

*Lymphocytic*—Infectious lymphocytosis, infectious mononucleosis, pertussis, varicella.

*Unfavourable signs in leucocytic picture*—(i) Extremely high total number of leucocytes with high percentage of neutrophils. (ii) Failure to develop leucocytosis. (iii) High proportion of immature cells, especially if they outnumber the mature forms (iv) Absence of eosinophils (v) Marked absolute reduction of lymphocytes (vi) Presence of numerous toxic degenerative forms.

LEUCOPENIA—

1 *Starvation* or *malnutrition*.
2. *Defective production*—(a) Hereditary—Infantile genetic agranulocytosis, familial benign chronic neutropenia, neutropenia with pancreatic dysfunction. (b) Acquired—(i) Ineffective myelopoiesis: vitamin B12 or folate deficiency. (ii) Marrow infiltration: Leukemia, myelofibrosis, carcinóma, myeloma, lymphoma. (iii) Drugs or irradiation.
3. *Excessive destruction*—(i) Isoantibody: Neonatal. blood transfusion (ii) Autoantibody: SLE, RA. (iii) Drug-dependent antibody: Aminopyrine.
4. *Other causes*—Hypersplenism, hemodialysis

*Immature forms*—myelocytes, myeloblasts or persistent large number of lymphocytes or immature forms indicates leukemia.

**Platelets :**

Normal 150,000-350,000/c mm. 150-350×$10^9$/1 (See p. 360).

5. *Elimination of salicylates*—from circulation can be enhanced by forced alkaline diuresis and by hemodialysis if severe poisoning and if acid base balance cannot be corrected easily.

### Paracetamol poisoning

**Clinical picture**—A single oral dose of about 15 g is likely to cause severe liver damage which may be spontaneously reversible, while a dose in excess of 25 g will probably result in irreversible liver damage and most probably death. Signs of liver disorder only appear after 2-3 days and there are few other symptoms.

**Treatment**—Specific antidote given within 10-12 hours of ingestion can result in recovery. Methionine 2.5 g orally, followed by 3 further doses at 4-hourly intervals or Cysteine 150 mg/kg by slow IV injection, then 50 mg/kg IV over 4 hours, followed by 100 mg/kg IV over 6 hours.

### Acute morphine poisoning

**Clinical features:** Pin point pupils, respiratory depression, cyanosis, hypothermia, hypotension, coma. Multiple injection marks may be seen in addicts.

*Nalorphine test*—10 mg. Nalorphine is given IV. Immediate response in form of increase of respiratory rate and dilatation of pupils confirms diagnosis in doubtful cases

**Management:**

1 *Gastric lavage*—Dilute potassium permanganate solution is used and lavage continued till the returning fluid is of the same colour.

2 *Antidotes*—Nalorphine (Lethidrone) 5-10 mg IV to be repeated after ½ hour if necessary Total dose not to exceed 40 mg., or levallorphan (Lorphan) 2 mg IV, repeated as necessary.

3 *Supportive treatment*—IV fluids, maintenance of B.P. and of temperature.

4 *Assisted respiration*—in case of severe respiratory depression not responsive to above measures.

## SNAKE BITE

*Common poisonous snakes are*—Indian cobra, common krait, Russel's viper and sawscaled viper.

*Decreased*—(i) Polycythemia. (ii) Whooping cough (iii) Sickle cell anemia. (iv) Cardiac decompensation (v) Agammaglobulinemia and fibrinogenopenia

*No increase*—Generalised blood infection without localisation e g. influenza, cystitis, sometimes infective process in CNS, fibrotic carcinoma or early sarcoma.

*Value of ESR estimation*—

(a) *In diagnosis* (of little value)—(i) To distinguish functional from organic disease. (ii) Infective arthritis, acute gout and active rheumatoid arthritis cause an increase in the rate, but in osteoarthritis it is normal or only slightly increased (iii) The rate is increased by pelvic inflammation but not with an unruptured ectopic gestation. (iv) The rate is always rapid in malignant pelvic tumors but not in simple pelvic tumors.

(b) *In prognosis and treatment*—(i) In fevers, a rising ESR suggests progress of the disease or onset of complications. (ii) In rheumatic fever, it is a specially sensitive index of persistent rheumatic infection (Cardiac failure gives falsely low and anemia falsely high values). (iii) In acute nephritis, the rate remains high in patients passing into the chronic stage.

**Fragility of erythrocytes**—

*Normal*—Begins in 0.45-0.39% NaCl (77-67 mmol/1 NaCl).

Complete in 0.33-0.30% NaCl (56-51 mmol/1 NaCl).

*Increased*—Congenital hemolytic jaundice, aplastic anemia.

*Reduced*—Pernicious anemia, sickle-cell anemia, hypochromic anemia, hemolytic anemia, obstructive jaundice, after splenectomy.

**Ceruloplasmin and copper**—Normal: Ceruloplasmin 27-37 mg /100 ml., Copper 70-140 mcg./100 ml (11-22 mol/1).

*Elevated*—Pregnancy, hyperthyroidism, aplastic anemia, acute leukemia, cirrhosis of liver.

*Decreased*—Wilson's disease.

**Gamma globulins** (Immunoglobulins):

| Immunoglobulin | Serum conc mg/100 ml |
|---|---|
| IgG | 800-1500 |
| IgA | 150-300 |
| IgM | 50-200 |
| IgD | 0-40 |
| IgE | 17-450 ng/ml |

pressure with a pressure bandage over the site of venom injection, combined with immobilization of the limb involved results in marked retardation of venom movement. (b) Incisions at site of bite and suction of blood and oozing fluid by breast pump may succeed in removing as much as 50% of the poison. However it increases risk of local infection and if anticoagulation action has already set in it may cause profuse bleeding. (c) If patient is seen late the swelling and inflammation should be treated by elevation of the limb, mag sulph. compresses, heparinoid ointment and broad spectrum antibiotic. (d) Surgical debridement and skin grafting may be necessary at a later stage in case of extensive necrosis

2 ANTIVENOM—Anti-snake venom serum available as freeze dried powder for easy storage. It is reconstituted by adding distilled water. Sensitivity should be tested by giving in intra-dermal test dose, 20 ml. of the serum is given IV as first dose slowly over 20 minutes. Second dose can be repeated 2 hours later if symptoms persist. Further doses can be repeated 6-hourly till symptoms disappear. Children require same dose as adults.

3 GENERAL TREATMENT—(i) Tetanus toxoid 1 ml IM. (ii) Antihistamines to reduce severity of allergic and inflammatory reactions (iii) Analgesics for local pain. (iv) Sedation with diazepam (v) Corticosteroids—IV hydrocortisone 100 mg. 6-hourly in case of severe shock, generalised allergic reactions and sensitivity reactions due to serum

4 MANAGEMENT OF COMPLICATIONS—(i) *Respiratory paralysis*—Use of IPPB (ii) *Acute renal failure*—Anuria may result from hypotension, loss of circulating blood volume due to oozing from blood vessels, severe hemolysis and hemoglobinuria or acute tubular necrosis due to direct action of venom Treated by IV fluids, mannitol, or if no improvement by peritoneal dialysis (iii) *Hemorrhagic diathesis*—The precise abnormality causing the bleeding should be determined. Fresh blood transfusion should be given immediately (iv) *Shock*—Plasma volume expanders and vasopressors.

logical—pregnancy, alimentary hyperglycemia, ultra-violet light exposures, administration of irradiated ergosterol.

*Decreased*—Hypothyroidism, growth retardation in children.

**Acid phosphatase**—0.5-2 units.

*Increased*—in carcinoma of prostate particularly, with bone metastasis.

**Amylase**—Less than 160 Caraway units/100 ml.

*Increased*—Acute pancreatitis, carcinoma of pancreas, certain cases of perforated peptic ulcer. Paralytic ileus, acute cholecystitis, cirrhosis, mumps, renal failure.

*Decreased*—Necrotising hepatitis, severe burns with liver damage.

**Lipase**—0-1.5 units.

*Increased*—Acute pancreatitis, carcinoma of pancreas, cholelithiasis with jaundice, cirrhosis or carcinoma of liver, intestinal obstruction, duodenal ulcer.

**Transaminase enzymes**—Glutamic oxalacetic transaminase (SGOT) 5-40 units Glutamic pyruvic transaminase (SGPT) 5-35 units.

*Elevated*—(i) Hepatic disease—Hepatitis, cirrhosis of liver, hepatic congestion, metastatic carcinoma. (ii) Cardiac disease—Myocardial infarction (iii) Miscellaneous—Skeletal muscle disease, hemolysis, acute pancreatitis, renal or cerebral necrosis, shock, pulmonary infarction, dermatomyositis, progressive muscular dystrophy, delirium tremens.

**Creatinine phosphokinase** (CPK)—0-12 Sigma units/ml.

*Elevated*—In presence of muscle damage e.g. myocardial infarction, trauma to muscle, progressive muscular dystrophy, polymyositis, and severe muscular exertion, delirium tremens, hypothyroidism.

**Lactic dehydrogenase** (LDH)—Normal—150-450 units/ml.

*Elevated*—All conditions accompanied by tissue necrosis, particularly those involving acute injury of the heart, red cells, kidney, skeletal muscle, liver, lung and skin. Marked elevations accompany hemolytic anemias, and the anemias of vitamin $B_{12}$ and folate deficiency, and polycythemia rubra vera. Although elevated in acute phase of infectious hepatitis, enzyme activity is seldom increased in chronic liver disease.

**Serum aldolase**—Normal 0-11 milliunits/ml. (I U.).

5. *Trauma*—Crush injury, head injury.
6. *Metabolic*—Gout, porphyria.
7. *Endocrine*—Thyrotoxicosis, Addison's disease.
8. *Hypersensitivity reactions*—Serum sickness, drug fever e.g. sulphonamides, atropine, morphine, salicylates, phenytoin, methyldopa, isoniazid, iodine Post myocardial infarction syndrome.
9 *Heat hyperpyrexia.*
10. *Skin diseases*—Pemphigus, bullous dermatosis.
11. *Miscellaneous causes*—(i) Cirrhosis of liver. (ii) Dehydration. (iii) Sarcoidosis. (iv) Recurrent pulmonary infarcts. (v) Crohn's disease. (vi) Familial Mediterranean fever. (vii) Whipple's disease (intestinal lipodystrophy).

PHYSIOLOGICAL VARIATIONS—

*Habitual hyperthermia*—In some individuals the temperature is set at a higher level than normal.

*Heat fever*—During the summer months, the body temperature especially in young children and old people may become elevated towards the early afternoon and continue so for some hours.

*Psychogenic fever*—The body temperature tends to be labile in some and may be elevated by emotional stimuli.

*Factitious fever*—in case of malingerers.

**Investigation of a case of prolonged pyrexia:**

I. **History:**

1. *Onset*—Sudden in pyelitis, pneumonia, influenza. Gradual in typhoid, typhus, pulmonary tuberculosis, subacute bacterial endocarditis, brucellosis, etc.
2 *Rigors*—Malaria (continuous type of fever likely in malignant infection), filaria, empyema, pyelitis, cholangitis, hepatic or appendicular abscess, septicemia. Rarely typhoid at onset.
3. *Headache*—Meningitis, typhoid at onset, typhus, smallpox, encephalitis.
4 *Bodyache*—Influenza, dengue fever, smallpox, fever of secondary syphilis, brucellosis, rat bite fever, relapsing fever.
5. *Sweating*—Malaria, pulmonary on miliary tuberculosis, influenza, rheumatic fever, amoebic hepatitis or abscess, brucellosis, relapsing fever, psychogenic.

**Cavity (Containing air or fluid):**

1. With thin shaggy walls—Abscess, br. carcinoma. T.B.
2. With thin walls—Lung cysts, mycotic cavitation, T.B. (caseous), and bullae.
3. With cavity disproportionately small in relation to the wall —Bronchogenic carcinoma.

**Calcification of chest:**

1. *Trachea-Bronchi*—Senile.
2. *Pulmonary*—(a) Congenital—(i) Dermoid. (ii) Hamartoma, AV aneurysm. (c) Microlithiasis alveolaris pulmonale (familial). (b) Infections—(i) Tuberculosis. (ii) Histoplasmosis. (iii) Parasitic: Guniea worm, cysticercus, (c) Inhalation: Silicosis, asbestosis. (d) Neoplastic—(i) Primary: Bronchial Ca arising near or in TB focus. (ii) Secondary: Osteogenic sarcoma. (e) Broncholiths.
3. *Pleura*—Plaques following empyema, T.B., hemothorax, pneumoconiosis.
4. *Mediastinal*—(a) Lymph glands—T.B., sarcoid, pneumoconiosis. (b) Tumors—Thyroid adenoma, aneurysm, teratodermoid cyst.
5. *Cardiac*—Aortic arch, pericardium, valves or valve rings, thrombi, left atrium in MS, coronary arteries, patent ductus.
6. *Chest wall*—(a) Costal cartilage. (b) Healing rib fractures. (c) Tuberculous glands. (d) Osteomas and chondromas. (e) Soft tissue calcification—(i) Parasitic: cysticercosis, guinea worm, armillifer armillatus. (ii) Myositis ossificans. (iii) Breast tumors. (f) Intercostal arterial calcification (in renal osteodystrophy).

**Rib notching:**

1. Arterial—(a) Aortic obstruction—Coarctation. (b) Subclavian obstruction—Taussig-Blalock operation, obstructive arteritis. (c) Pulmonary oligemia—Pulmonary artery atresia, PS, Fallot's and Ebstein's anomalies.
2. Venous—SVC and IVC obstruction.
3. Arterio-venous fistulae.
4. Neurofibromatosis.
5. Idiopathic.

**Elevation of diaphragm:**

*Unilateral*—Scoliosis, eventration, phrenic palsy, avulsion or crush; basal pleural or pulmonary infection, basal pulmonary infarct, subphrenic infection, subdiaphragmatic tumor.

tions of urinary tract (e) Rapid variation—Temperature going up and down rapidly may suggest psychogenic fever

2. *Pulse rate*—Relative bradycardia in typhoid, meningitis, influenza, dengue, Weil's disease.
3. *Respiration*—Hurried in pneumonia and broncho-pneumonia, pulmonary T.B , pleural effusion or empyema, miliary tuberculosis, pulmonary infarction.
4. *Anemia*—Malaria, kala-azar, septicemia, subacute bacterial endocarditis, chronic sepsis, amoebic liver abscess.
5. *Lymphadenopathy*—(i) *Generalised*—in tuberculous glandular enlargement, secondary syphilis, Hodgkin's disease, glandular fever, septicemia, lymphatic leukemia, histoplasmosis, trypanosomiasis (ii) *Localised in*—plague, rat bite fever, tick typhus, glandular fever, lymphogranuloma inguinale, tularemia.
6 *Jaundice*—with fever in infective hepatitis, Weil's disease, malaria, infectious mononucleosis, liver abscess.
7. *Toxemia*—Little or no toxemia in presence of moderately high fever points to B coli infection of urinary tract, kala-azar, pulmonary or glandular tuberculosis, localised suppurative process, leukemia.
8 *Skin*—(a) *Rash*—in typhoid, typhus, meningococcal meningitis, rat bite fever, relapsing fever, trypanosomiasis. (b) *Any deposits.* (c) *Petechial hemorrhages*—Smallpox, cerebrospinal meningitis, septicemia, Weil's disease, malignant diphtheria, typhus, typhoid, subacute bacterial endocarditis
9 *Clubbing of fingers*—Bronchiectasis, lung abscess, chronic empyema, subacute bacterial endocarditis, liver abscess.
10 *Arthritis*—Rheumatic fever, subacute bacterial endocarditis, brucellosis, gout, meningococcemia, leukemia, disseminated lupus, polyarteritis nodosa.
11. *Nails*—Transverse white bands on the nails may be seen in undulant fever.
12. *Herpes labialis*—occurs with pneumococcal infection, streptococcal infection, meningococcemia, malaria, Rickettsial infection.
13 *Nodules*—in rheumatic fever, rheumatoid arthritis, leprosy, erythema nodosum, cysticercosis, polyarteritis nodosa.
14. *Local lesion*—Eschar in mite typhus, flare up of site of wound in rat bite, necrotic papule in tularemia.

Partial nephrectomy.
Post-traumatic atrophy.
Congenital hypoplasia.
Radiation nephritis.

*Bilateral*—

Generalised arteriosclerosis or nephrosclerosis.
Chronic glomerulonephritis.
Papillary necrosis.
Bilateral renal artery stenosis.
Urate nephropathy.
Amyloidosis.
Airport's syndrome.
Medullary cystic disease.

**Enlarged kidney(s):**

*Unilateral*—

Hydronephrosis.
Hypernephroma.
Compensatory hypertrophy following nephrectomy of other kidney or hypoplasia.
Renal vein thrombosis (acute stage).
Acute renal infarction.
Unilateral duplex kidney.
Simple cyst.

*Bilateral*—

Nephrotic syndrome.
Diabetic glomerulosclerosis.
Acute tubular or cortical necrosis.
Acute urate nephropathy.
Leukemia.
Amyloidosis.
Multiple myeloma.
Miscellaneous—Cirrhosis, acromegaly, hemophilia, homozygous sickle cell disease.

## Skull and bone radiographs

**Punched-out translucencies in skull:**

*Physiological*—Arachnoid granulations (parasagittal), emissary parietal foramina, parietal fenestrae, increased convolutional markings.

dysentery infection. Rarely ascaris lumbricoides infection may produce fever. Ocult blood.

4. *Chest radiograph*—may show tuberculosis or atypical pneumonia.
5. *Other tests*—
   (a) Liver function tests.
   (b) *Blood culture*—Typhoid and paratyphoid, septicemias including subacute bacterial endocarditis; brucellosis, leptospirosis, histoplasmosis.
   (c) *ESR*—not of diagnostic value but normal E.S.R. rules out active pulmonary tuberculosis, rheumatic fever, and suppurative diseases Psychogenic fever should be suspected when a lowgrade fever has lasted for a very long time with normal sedimentation rate.
   (d) *Agglutination tests*—Widal reaction for enteric group, agglutination in brucellosis, etc. Cold agglutination test in virus pneumonia Paul-Bunnel or monospot test.
   (e) *Serological tests*—to exclude syphilis.
   (f) *L E. cell phenomenon*—in peripheral blood in disseminated lupus erythematosus.
   (g) *Mantoux test*—A negative reaction virtually excludes diagnosis of tuberculosis (The reaction may be negative in acute miliary tuberculosis.)
   (h) *CSF*—when suspicion of meningitis or encephalitis.
   (i) *Sputum examination*—for purulence and culture.
   (j) Auto-antibody tests—e g rheumatoid factor
   (k) Serum immunoglobulins.
   (l) Plain abdominal radiograph
   (m) *Skin tests*—(i) Kveim test—for sarcoidosis. (ii) Tularemia—Intradermal injection of a killed suspension of Pasturella tularensis gives a positive test by the fourth day of the disease; negative test does not exclude it. (iii) Histoplasmosis—with histoplasmin, an antigen prepared from culture of Histoplasma capsulatum.

B **Non-invasive procedures:**

1. *Ultrasound investigation*—for imaging of almost all the abdominal and pelvic viscera.
2. *Isotope scanning*—e.g. liver scan for detection of abscess Combining liver and lung scan may be useful in demonstration of right-sided subphrenic abscess.
3 *CT scanning*—The image resolution obtained is superior to all other methods and small lesions can be detected. It is

5. Renal osteodystrophy.
6. Hypervitaminosis A.
7. Fluorosis.
8. Paget's disease.

**Decreased bone density:**

*Osteomalacia* (defective calcification of osteoid):

1. Dietary calcium deficiency.
2. Dietary vitamin D deficiency.
3. Steatorrhoea.
4. Chronic renal failure—(a) Glomerular failure. (b) Renal tubular defects.
5. Hepatobiliary disease.
6. Primary vitamin D sensitive osteomalacia.

*Osteoporosis*: (Lack of bone matrix with secondary loss of mineral):

1. Disuse—Prolonged recumbency or immobilisation of a limb.
2. Postmenopausal.
3. Senile.
4. Dietary—Protein starvation or avitaminosis D.
5. Lack of sex hormones—Ovarian agenesis, eunuchoidism, Klinefelter's syndrome, hypopituitarism.
6. Hyperadrenalism—Cushing's syndrome, prolonged corticosteroid therapy.
7. Hyperthyroidism.
8 Rheumatoid arthritis.
9. Physical injury to osteoid—Overdose of deep x-rays.
10. Idiopathic.

## 21. SOME DRUGS WITH MULTIPLE INDICATIONS

**Beta-blockers:**

1. Angina and secondary prevention of myocardial infarction.
2. Cardiac arrhythmias.
3. Hypertension.
4. Hyperthyroidism—for symptomatic relief and for preparing patients for surgery.
5. Prophylaxis of migraine.
6. HOCM.
7. Alcohol-withdrawal.
8 Anxiety and anxiety-induced tremors.
9. Myasthenia gravis.
10. Postural hypotension (Beta-blocker with marked partial agonist activity).

cin. (ii) Diuretics—frusemise, ethacrynic acid. (iii) Salicylates. (iv) Quinine, quinidine. (v) Caffein. Dilentin Sulphonamides Toxins—alcohol, tobacco, carbon monoxide. (b) Head injury may cause hemorrhage of varying degree into the labyrinth with resulting vertigo. The vertigo under these circumstances follows immediately after the injury and is typically severe and paroxysmal with increase of the vertigo on change of posture of the head. (c) Acute and chronic otitis media.

(ii) *Meniere's disease*—usually starts under age of 50 and is characterised by recurrent episodes of vertigo accompanied by tinnitus and deafness. Between episodes the patient is perfectly well except for the persistence of these symptoms The vertigo may persist for days, recurring daily or several times a day or it may occur at irregular intervals for weeks or months. Almost always it is possible to find a neutral position in which it is possible to lie without a sensation of vertigo and gradually the severe vertigo subsides as this position is maintained. Associated with the vertigo is vomiting, severe nausea, sweating, and low blood pressure and in severe instances incontinence. The vision is blurred and sometimes true diplopia may be experienced. In some instances, the vertigo may be so severe that it is associated with syncope.

*Management*—(a) *During attack*—patient is made to lie flat and perfectly still. Dramamine 50 mg. by mouth or Prochlorperazine (Stemetil) 25 mg. IM or Betahistine dihydrochloride 8 mg. t d s. after meals. Antihiamines should not be given concurrently (b) *Prevention of attacks*—Treatment is symptomatic since the cause for the endolymphatic hydrops is not known. Vasodilator drugs such as Betahistine 8 mg t.d.s and vestibular sedatives e g. Cinnarizine 15 mg. t.d.s For incapacitating vertigo production of labyrinthire damage by injection of alcohol into internal ear or section of vestibular nerve, or labyrinthine drainage procedure Labyrinthectomy offers sure relief of vertigo but hearing loss is complete and permanent.

2. MIDDLE EAR—Obstruction of the Eustachian tube.
3 EXTERNAL EAR—Wax impinging on ear drum.

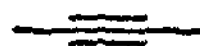
B. **Ocular causes**—

- Ocular vertigo is never severe.

1. *Abnormalities in the dioptric apparatus*—in individuals who wear glasses for first time especially if lenses are fairly strong convex type

4. Acute illnesses—Anaphylaxis, shock, septicemia, status asthmaticus, acute lymphatic leukemia, acute exfoliative dermatitis.
5. Reduction of raised intracranial pressure—in cerebral oedema.
6 Adrenal hyperplasia (Suppression of pituitary ACTH).
7. Disseminated breast cancer (Inhibition of adrenal secretion of androgens—medical adrenalectomy).
8. Local use—(a) Topical therapy—(i) Skin diseases—Eczema, psoriasis. (ii) Allergic eye conditions. (iii) Severe nasal allergy and allergic rhinitis. (b) Intra-articular—Rheumatoid arthritis, peritendinitis. (c) Epidural—chronic sciatica or sciatica with root interruption (d) Aphthous ulcers in mouth
9 Miscellaneous—Ulcerative colitis and proctitis, nephrotic syndrome, acute gout, hypercalcemia (of sarcoidosis, myelomatosis and other malignant diseases and vitamin D intoxication); toxic and virus encephalitis, aspiration pneumonia and pulmonary oedema from near drowning, Hurner's ulcer of the bladder.

B DIAGNOSTIC—1 Hydrocortisone suppression test for hypercalcemia. 2 Dexamethasone suppression test for Cushing's syndrome.



and unpleasant sights, exhaustion, hot atmosphere, long period of standing in same position may produce syncope. This is called vasovagal attack The patient appears pale, there is usually slow pulse, low blood pressure and dilated pupils.

2. *Carotid sinus syndrome*—Attacks of unconsciousness result from hypersensitivity of carotid sinus, and occur most frequently in elderly and in association with hypertension and arteriosclerosis.

3. *Postural syncope*—as a result of failure of baroreceptors which normally adjust heart rate and peripheral resistance in response to change of posture. Causes—(a) Arising abruptly from a prolonged period in recumbent position often causes giddiness and syncope particularly in presence of cerebral vascular insufficiency. (b) Following strenuous physical exercise. (c) Chronic orthostatic hypotension may result in giddiness or syncope or both following a decline of systolic pressure usually at least 30 mm. mg. when the patient remains stationary in the upright position. (d) In association with neurologic disorders such as diabetes mellitus and other forms of polyneuritis and patients receiving drugs such as phenothiazines, Parkinson's disease especially in elderly patients treated with L-Dopa.

4. *Cerebral syncope*—Syncope may be a consequence of direct brain damage secondary to trauma or associated with carotid or vertebro-basilar disease Recurrent attacks of syncope more in the erect posture. In subclavian steal syndrome exercise of the involved arm is followed by syncope.

5. *Cough syncope*—may occur after paroxysms of cough especially in patients with bronchitis and emphysema and is caused by increase in intrathoracic pressure which occurs with coughing and impedes venous return to the heart

6. *Micturition syncope*—may occur in men with lower urinary tract obstruction straining excessively to pass urine usually at night.

B **Syncope due to inadequate cardiac output (Cardiogenic syncope)**—

1. *Cardiac disease*—causing central circulatory obstruction—Aortic stenosis, pulmonary stenosis, pulmonary hypertension, atrial myxoma, ball valve thrombus, angina pectoris and myocardial infarction, dissecting aortic aneurysm

2 *Cardiac arrhythmia*—Attacks of paroxysmal tachycardia particularly in elderly, high grade partial heart block,

# INDEX

## 4. VISUAL FAILURE

### PROGRESSIVE DIMNESS OF VISION

**Causes and Differential Diagnosis:**

1 CATARACT—The so-called senile type of cataract is the most common cause of progressive failure of vision. It usually occurs after the age of 60 The degree of dimness depends on the nature and location of the opacity. An early symptom complained of is discomfort in bright light Patients with progressive cataract may have a rapidly changing error of refraction towards myopia and a need for frequent change of glasses. Monocular diplopia may occur. Cataract can be seen when the eye is examined after dilating the pupil with homatropine.

2 GLAUCOMA—It is a condition in which there is increase of intraocular pressure Chronic simple glaucoma is not an uncommon cause of progressive dimness of vision It usually occurs in elderly people and is commonly bilateral, though not equal, in both eyes The symptoms are pain in the eye and headache The bulbar conjunctiva is injected. Visual field defects develop. Characteristics glaucomatous cupping may be seen on fundoscopy. A history of frequent changes of reading glasses over a period of few months should suggest the possibility of chronic simple glaucoma.

3 MYOPIA—Visual symptoms due to indistinctness of vision from failure of refraction, only rarely leads to progressive failure of vision It usually commences in childhood and increases till about the age of 20 years. The eyeballs feel tired and ache, the ache is slight or severe, usually dull. Pain is present when the eyes are used and for a period afterwards The pain is usually in the eyeballs but may be referred to the head. The eyes are watery and the conjunctivae may be congested. Recurrent styes may occur or blepharitis, complaints of dizziness, nausea and vomiting are not uncommon. Diagnosis is made by estimation of refraction.

4. DIABETIC RETINOPATHY—Virtually all diabetics develop retinal vascular changes in various degrees, in some these may progress to blindness. The diagnosis depends on examination of fundus which shows hemorrhages, exudates and in some cases proliferative retinitis Blood sugar will be high.

5. RETINAL DEGENERATION—(a) *Macular degeneration*—is most frequent after middle age; slow painless visual deterioration is associated with more acute failure due to hemorrhage.

## BLINDNESS OF ABRUPT ONSET

**Causes and Differential Diagnosis:**

1. *Assumed blindness*—usually restricted to one eye. Brisk pupils Absence of any visible change in media, disc or fundus.

2 *Ischemic optic neuropathy*—Characterised by abrupt uniocular impairment of vision The second eye may become involved after interval of months or even years. The optic disc is swollen with peripheral linear hemorrhages. The disc starts to become pale within the first week. The field loss is permanent. Fluorescein angiography during the first week or two shows defective perfusion of the optic nerve head by the ciliary vessels Causes—(a) Atherosclerosis—Ischemic optic neuropathy occurs most commonly after 50 and is often associated with diabetes. (b) Cranial arteritis—Severe form with intense headache, often band-like and continuous, and sometimes associated with cramps in legs or abdominal pains, E.S R often high. (c) Migraine—Rare mechanism of permanent visual impairment is migraine.

3 *Retrobulbar neuritis*—Demyelinating optic neuritis is one of the commonest causes of acute visual loss in patients between the ages of 20 and 40 History of rapid and severe loss of vision in a period of 2-5 days Patients present with a dense central scotoma, with some tenderness over the superior rectus muscle The fundus is often normal, though the disc may be slightly swollen. Spontaneous recovery with or without treatment in a few weeks. If the other eye follows suit later, this is almost pathognomonic of MS.

4. *Leber's optic atrophy*—Virtually confined to males. Unlike optic neuritis significant improvement in vision is exceptional. Positive family history.

5 *Inflammatory lesions of the orbit*—(a) Pyogenic infections of the paranasal sinuses may occasionally spread to the orbit and involve the optic nerve (b) Acute granulomatous infiltration of orbit—Painful ophthalmoplegia with proptosis and conjunctival oedema resembling cavernous sinus thrombosis.

6. *Intracranial space-occupying lesions*—may present with acute visual loss. Mechanisms—(a) Direct compression of visual pathways by tumor may suddenly increase giving rise to a noticeable field defect especially with masses in region of optic nerve and chiasm (b) Indirectly as a result of sudden rise in intracranial pressure in benign intracra-

## 5. THE VITAMINS

### Fat soluble vitamins

| *Food sources, daily requirement, therapeutic dose and toxic effects (if any)* | *Symptoms and signs of deficiency* |
|---|---|
| **Vitamin A** | |
| Animal: Milk, butter, liver and fish liver oils, egg yolk<br>Vegetable: (carotene precursors) carrots, sweet potatoes, apricots, spinach<br>5,000 IU (1 5 mg vitamin A)<br>5,000 IU/kg body weight/day<br>*Acute toxicity* (massive single dose)—Abdominal pain, nausea, vomiting, headache, dizziness followed by generalised desquamation of skin.<br>*Chronic toxicity*—Bone and joint pains, loss of hair, fissuring of lips, anorexia, benign intracranial hypertension, weight loss, hepatomegaly. | Follicular hyperkeratosis of skin<br>Bitot's spots<br>Night blindness<br>Xerophthalmia and keratomalacia<br>Imperfect enamel formation of teeth |
| **Vitamin D** | |
| Fish liver oil, milk, egg yolk, butter, yeast Synthesis in the skin when it is irradiated.<br>400 IU (IU=0 025 mg. vitamin $D_2$)<br>5,000 IU/day. High doses upto 50,000 IU/day, must be given only for short periods because of risk of renal damage<br>Anorexia, lassitude, vomiting, diarrhoea, profuse sweating, | Tetany and rickets in infants and children<br>Osteomalacia in adults<br>*Causes of vitamin D deficiency*—<br>1 Inadequate diet.<br>2 Inadequate sunlight.<br>3. Malabsorption.<br>4. Defective production of active metabolites of vitamin D—Liver failure, renal disease, anticonvulsant therapy. |

## Beriberi

**Cardiovascular system—**

PATHOGENESIS of berberi heart disease—(a) Peripheral vasodilation with resultant high output state. (b) Myocardial failure. (c) Retention of sodium and water leading to oedema

CLINICAL PICTURE:

1. *Chronic form*—High cardiac output, tachycardia, elevated venous pressure, oedema. Decreased cerebral and renal blood flow.
2. *Acute fulminating type*—Severe dyspnoea, cyanosis, restlessness, tachycardia, marked cardiomegaly, hepatomegaly.

**Nervous system—**

1. *Peripheral neuropathy.*
2. *Wernicke's encephalopathy* (cerebral beriberi)—Vomiting, nystagmus, ophthalmoplegia due to rectus palsy, fever, ataxia and progressive mental deterioration and confusion with ultimate coma and death.
3. *Korsakoff's syndrome*—Retrograde amnesia, impaired ability to learn and often confabulation.

**Diagnosis**—Measurement of whole blood or erythrocyte transketolase activity. If the activity of the enzyme is increased more than 15% by adding thiamine diphosphate, it is suggestive of thiamine deficiency.

**Treatment:** Thiamine 50 mg IM daily for few days followed by oral 2 5-5 mg daily Other water-soluble vitamins must be given simultaneously.

## Pellagra

**Clinical features:**

PRODROMAL SYMPTOMS—Increasing weakness, lassitude, anorexia, sensation of burning in epigastrium and tendency to diarrhoea, depression and irritability.

FULLY DEVELOPED SYNDROME—

1. *Alimentary tract*—(i) Glossitis and stomatitis—Hypersensitiveness of tongue to hot or spiced foods, later smooth, dry, fissured, beefy red, angry looking tongue. Aphthous ulcers common. Stomatitis with increased salivation Swallowing may be difficult. (ii) Diarrhoea—few to 10-15 stools per day, often with tenesmus (iii) Achlorhydria.

## 6. DISORDERS OF WATER AND ELECTROLYTE METABOLISM

**Normal water metabolism**—Under normal conditions the body gains water from oral fluid intake, from diet, and as end-product of metabolism (about 500 ml/day). Water is normally lost through the skin (about 500 ml in temperate climates), through the lungs in the breath (about 700 ml/day), in the faeces (about 50 ml/day) and in urine. The renal loss of water is accurately regulated to maintain the osmolality of body fluids between 280-294 mosmol/kg. Thus, in the anuric patient intake of about 750 ml/day is required to maintain total body water constant.

**Water excess:**

*Causes*—1 *Acute renal failure* with oliguria or anuria. 2 *Glucocorticoid deficiency*—Addison's disease, anterior pituitary failure. 3 *Syndrome of inappropriate ADH secretion*—malignant tumors such as oat cell carcinoma of bronchus, head injury, acute alcoholism, encephalitis, lung disease e.g. pneumonia or tuberculosis, myxoedema, acute porphyria. 4. *Drug therapy* e.g. chlorpropamide, carbamazepine. 5. *Severe chronic renal failure* and intermittent haemo-and peritoneal dialysis when intake is excessive. 6. Hypothalamic lesions. 7. Compulsive water and beer drinking. 8. Inappropriate IV fluid therapy.

*Symptoms and Signs*—(a) Arising from CNS—nausea, vomiting, headache, drowsiness, fits and coma. (b) Peripheral oedema —is not a feature of water excess alone.

*Investigations*—Diagnosis confirmed by finding a low plasma osmolality and low plasma sodium concentration in absence of manifestations of sodium depletion

*Treatment*—Restriction of water intake to about 5000 ml/day. Hypertonic saline infusion if severe hyponatremia (plasma sodium $<$115 mmol/litre).

**Water deficiency:**

*Causes*—1. Water scarcity 2 Inability to signify thirst—Severe illness, impaired consciousness, intubation or ventilation. 3. Severe dysphagia. 4. Cranial diabetes insipidus especially if consciousness is impaired. 5. Nephrogenic diabetes insipidus. 5. Osmotic diuresis—diabetic ketotic coma, non-ketotic hyperosmolar diabetic coma.

*Symptoms and Signs*—1 Thirst is the main symptom. 2. In advanced cases cerebral disturbances leading to confusion, coma and even death.

urinary obstruction 4. Diabetes mellitus. 5. Excessive diuretic therapy. 6 Excessive ultrafiltration by haemo- or peritoneal dialysis.

*Symptoms and Signs*—Sunken eyes and cheeks. Weakness, faintness on standing, muscular cramps in legs and thirst. Cold. hands and feet and sometimes peripheral cyanosis. Skin inelastic and low intraocular pressure. Tachycardia and weak pulse. Postural hypotension early sign. Ultimately circulatory collapse and death may occur.

*Investigations*—Plasma sodium concentration may be low or normal. Raised plasma urea or creatinine indicates impaired renal function. Fluid input/output chart and daily weighing of patient and CVP line necessary.

*Treatment*—IV fluids in acutely ill patients, oral sodium chloride supplements for chronic sodium deficiency. For IV therapy, isotonic sodium chloride (0.9% solution) 154 mEq/litre (154 mmol/litre) 3-4 litres treatment of choice. Dextrose saline should not be used. Oral or IV sodium bicarbonate if metabolic acidosis in presence of renal impairment. Potassium chloride oral or IV when necessary.

**Disorders of potassium metabolism:**

**Potassium excess (Hyperkalaemia):**

*Causes*: 1. Acute renal failure with oliguria or anuria. 2. Severe chronic renal failure and intermittent haemo- and peritoneal dialysis when intake of potassium between treatments is excessive 3 Addison's disease, hypoaldosteronism. 4. Systemic acidosis—metabolic or respiratory. 5 Potassium-sparing diuretics and potassium supplements given to patients with poor renal function.

*Clinical features*—Sudden cardiac arrest may be the first manifestation Occasionally generalised weakness of skeletal muscles.

*Investigations*—Plasma potassium concentration increased Plasma bicarbonate concentration should be measured since evidence of marked metabolic acidosis indicates that the hyperkalemia may be largely due to redistribution of body potassium, rather than true excess, and its correction is likely to result in fall of plasma potassium. ECG changes—High peaked T waves, disappearance of P waves and widening of QRS complexes.

*Treatment*: Plasma potassium more than 6.0-6 5 mEq/litre is indication for immediate therapy. (a) Calcium gluconate—5-10